

A N
E S S A Y
O N
MANUFACTURING MILK
I N T O
B U T T E R A N D C H E E S E ;
A N D O N
C A L F - F E E D I N G , & c .
I N T E N D E D F O R T H E
P E R U S A L A N D B E N E F I T
O F
F A R M E R S .

By J A M E S S T E L E .

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PREFACE.

THERE have been many valuable improvements made of late years in the mechanic arts, in natural philosophy, and in chemistry, which have contributed greatly to the rise of trade, and improvement in manufactures of different kinds, over all the British dominions.

These, with the increase of the population, particularly of manufacturing towns and villages, together with the better manner of life, which labouring people have been, by these means enabled to attain unto, have conduced not a little to enhance the price of almost all vivers; particularly of beef, veal, butter, and cheese, &c. upon which account these articles are become staple commodities, and an object of particular attention to farmers.

While many subjects, which, in our opinion, are not more important than this, have been repeatedly and elaborately written upon, this has been hitherto almost altogether neglected, though, undoubtedly, well intitled to attention, and as capable of improvement from the press as several others, upon which much labour and expence has been bestowed.

None, so far as we know, has written on this subject, at least expressly, and in a direct manner: we have it not, therefore,

in our power to introduce this paper to the public, upon account of the imperfections of former writers on this subject; neither have we a long account of the improvements, which have been made by many able writers upon it, to exhibit.

We are sensible, that though considerable advantage may be got by some, from what we have advanced on this subject, in the following Essay, if carefully attended to; yet we are clearly of opinion, that much more benefit might be derived from more enlightened writers on it, who might say more and better to the purpose than we are able to do: and should some one undertake the task, and enter more fully into the subject, who shall have a more perfect knowledge of the causes, occasioning the present imperfections of the business in every point of view: whose extensive abilities shall render him qualified to set forth, in a proper manner, whatever may be considered as a prerequisite to the making of cheese and butter, &c. with most advantage, and in the largest quantity, and highest possible perfection: with the propriety of calf-feeding, and the proper manner of doing these things, under the different circumstances in which farmers may be placed; and all these deduced from clear and obvious facts and observations, founded upon sensible principles:

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such a publication would, we think, be one of the most universally useful to farmers, as well as to the consumers of these very common and wholesome articles of diet; while it would prove equally as advantageous to the land-holders in many places.

Many farmers, in some places, stand not in need, it must be allowed, of any instruction on this antient branch of business, they having already acquired a sufficiently extensive stock of knowledge in every part of it, from experience and careful observation.

Nevertheless, it is humbly presumed, that not a few, even to this day, have not attained to all that extent of improvement, which might have been expected in the management of kine; neither have they arrived at the highest practical improvement in the manner of feeding and fattening calves; nor of preparing butter and cheese in the greatest possible perfection, nor in the largest quantity.

It is therefore, that we have written, and do presume the following Essay may be helpful to those, into whose hands it may fall, who have not as yet arrived to any very considerable degree of improvement in every part of this piece of rural business.

Were the feeding and fleshing of calves well understood, and more universally practised; and the manufacturing of milk into

butter and cheese, more completely improved in every part of this country in every respect; the quantity of these several articles would not only be much greater, but they would also be found in much higher perfection with respect to quality; both of these would have various beneficial effects.

For the industrious farmer would be able to produce a considerably larger quantity of these now very valuable, as well as useful commodities from his farm into the market, without almost any additional expence whatever. At the same time he would derive a larger share of gain from the mere increase of weight, he would beside receive a proportionable advance from the superior quality of the articles, and a quicker market.

And from being possessed of an extensive stock of knowledge respecting this subject, the assiduous farmer could never be at a loss how to dispose of his milk under every particular circumstance; and he would always be capable to determine when it would be most to his interest to dispose of it in any particular manner.

At the same time the farmers, a class of men upon whose industry so much in this, and in almost every other country, is constantly dependent, as a means, were doing good to themselves in this manner, they would much better serve the interest of

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their country, in fully answering the demand of the inhabitants in these things, without occasioning importation from other nations, by well improving ONE long much neglected, if not contemned, source of internal national wealth, without others sustaining the least injury thereby, in their respective situations or occupations. Not only the increase of these common eatables must be of consequence to the community, and have a tendency to enrich a kingdom, but their being clean, wholesome, and well prepared, and properly preserved, must appear of singular utility to all who truly value their health and life..

To what farther extent of sum, the gain could be brought to amount to, which might be obtained from well conducting the management of kine, and feeding calves in the proper manner, and to as considerable an extent as circumstances will possibly permit; and the manufacturing of milk to the most profitable account, and in the best manner, beyond that which it does now amount to, we could not even venture to determine with the least tolerable certainty, though we are inclined to conjecture, that it would not be inconsiderable.

In the following Essay, after some observations on the size and breed of milk kine, we have, in a very concise manner also, gi-

ven some directions respecting the pasturage of cows: and as more connected with the feeding and fleshing of calves, and the manufacturing of milk, we have introduced some remarks upon the qualities of milk, &c. then we have endeavoured to point out the utility, and manner of feeding and fleshing calves: and then the most improved manner of preparing full milk cheese, butter, and butter-milk, and blown or skimmed milk cheese and butter from milk, &c.

On treating of these, we have endeavoured to describe the most approved mode of doing each of them separately, and as minutely and accurately, as compatable with our ability and present design. In the same manner and natural order in which these, who well understand the business, usually execute them in actual practice; on these we have endeavoured to be as particular and accurate as we could, on purpose that persons of less understanding in these things, might, from attending to what we have said upon the subject, be assisted in preparing, from milk, any of these articles in the best manner, at their pleasure. And we have endeavoured, as we went along, to point out some of the more conspicuous causes, which, we judge, ought to have most weight with people in disposing them to adopt any one particular mode of doing with their

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milk rather than another; with some of the more obvious sources or causes from which the most considerable imperfections in the preparing of cheese and butter from milk does usually proceed. And also, that people in the various circumstances in which they are placed in, with regard to the subject in hand, might be, in some measure, enabled to know how to dispose of their milk at any time of the year, and upon any variation of circumstances, to the most profitable purpose, and in the best manner. And likewise, that, in the preparing of each of these articles, the produce of milk of whatever kind, an ignorant, careless, nasty manner, of accomplishing this piece of female business, so common in former periods of time, and not yet entirely rooted out, may be for ever entirely banished from this island, and cleanliness, elegance, and frugality promoted and established.

How far that which we have written, is truly calculated for these valuable ends, we must submit to others to determine.

This Essay, very probably, is not without considerable failings; the reader, perhaps, will HERE meet with omissions, and THERE with redundancies. In one place, perhaps, the method and oeconomy are not kept to; in another place, it may be that an article is imperfectly treated. But it should

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be considered, that as we are, as it were, the first adventurer on this subject, in this country, it is not reasonable to expect more perfection, than is commonly found in the first attempts of this nature.

We have made a number of observations on the subject, which are not readily to be found elsewhere: and if the novelty and importance of the subject, or observations thereon, should excite the curiosity of any person of greater abilities, or more leisure, more fully and accurately, to investigate this matter, he would certainly do an important piece of service to this country.

Should what we have written have the good effect, to contribute a little towards the improvement and better management of the articles we have treated, or towards exciting others, who have greater capacity and leisure, to write upon the subject, we shall think our time and pains well spent. Real mistakes, when pointed out, will be freely acknowledged; and a candid critic will have the Author's best thanks, for his remarks, or corrections. Owing to the Author's distance from the press, perhaps some errors may be met with; but he expects these will not be many, nor such as will much vary the sense to the attentive reader.

April 12th, 1794.

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AN ESSAY

ON MANUFACTURING MILK INTO

BUTTER, CHEESE, &c.

SIZE OF KINE.

I. **W**E are of opinion, that persons possessed of ordinary degrees of common understanding, are in some measure sensible, without the force of any particular arguments to prove and enforce it, that there are many pieces of land upon which kine of one size may be kept with more propriety than on another. As in almost every other country, so in this, the soil and situation are both vastly different. Some lands are of a high situation, and consequently cold; others are low situated, and are therefore warm. Some lands, whether high or low situated, produce grass sparingly, and some others plentifully. Some are dry and hard, others are soft and wet, inclining to bog or swamp.

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II. Though milk kine are preferable, one before another, upon several accounts, as we will afterwards have occasion for observing, yet with regard to the condition of the lands upon which they are to be pastured. Kine are more particularly preferable to one another, from their being of a large, of a medium, or of a small size.

III. The size of kine, with which a farmer stocks his farm, should be for these reasons, particularly well adapted to the condition of his farm, whatever soil or situation it shall happen to be of. For a farm which is dry and low situated, and bears grass plentifully, and of the proper quality, a stock of milk-cows of the largest size will be found to do extremely well, and more profitable than those of a small size would be upon that farm. Again, upon high situated lands which produce but a moderate quantity of grass, and not very fine, kine of the middle size, weighing from seventeen to twenty stone, will be found to be more profitable, and



therefore preferable to those of the largest size.

IV. Lands again which are pretty high situated, bearing but a small quantity of grass of a coarse kind, particularly if they are boggy and wet, and without fence or shelter, should be stocked with small cows, such as may weigh from ten to fourteen stone. Small cows bear toil and cold, without sustaining so much injury, better than those of the large kind, under these circumstances: and they are also capable of finding a sufficiency of food from a field of light grass, whereas large ones could not; they will likewise go over soft ground without going so deep into it, &c.

V. Likewise it ought to be considered in furnishing a farm with milk cattle, in what manner they are to be supplied in the winter season; because if they cannot be furnished with good bog or lea hay in winter, or otherways sufficiently fed, it will be found

very difficult to bring heavy cows through winter in proper condition.

VI. Therefore to be able to make a proper choice, in regard to size, in stocking a farm with cattle of this kind, will undoubtedly, upon a little reflection, appear of great importance to those who intend to derive profit from feeding them.

OF THE BREED OF MILK KINE.

VII. **T**HOUGH various particulars relating to kine, might be taken into consideration, under the term breed of kine, we intend only under this, the character or description of kine, which have been observed to milk plentifully, and a few other circumstances more particularly connected therewith.

VIII. We would define kine of a good breed those which milk plentifully, and of a rich quality, in proportion to their age, size, and feeding,

&c. It may be laid down as a general rule, that the larger the cow is, the greater quantity of milk she will give; and on the contrary, the less size she is of, the smaller quantity of milk she will afford: yet neither of these cases are found strictly true, of every individual animal in every instances; for conformable to daily experience and observation, we may observe that some kine, both of the large and small size, milk more plentifully than some others of the same size.

IX. The variations respecting the quantity of milk, which animals of this kind, though they are of the same age and size, and on the same feeding, &c. will be found to vary from one-fourth to one-third, and in several instances to one-half less; and in a few instances still more considerable variations may be met with.

X. Though we cannot pretend to be capable of conveying any particular information with regard to the breed of milk-kine, either with regard to ex-

ternal appearance or shape ; yet, as it may be useful for after observers, and in order to farther inquiry, we may observe, in general, that farmers, at least so far as we have been informed, when they wish to procure a good milk-cow, endeavour to pitch upon one low and broad, that is to say, one that is moderately short-legged, and of a round make of body, broad above the kidneys and loin bones, with a thin soft skin, covered with fine soft hair, having a small neck and head, with a pretty broad udder stretching somewhat along the belly, having four well shaped tails or paps placed at some distance from one another. The colour is, perhaps, not of the least moment : but brown, black, blackish-brown, are the most fashionable colours, or even white ; but white cows are said to be very soon injured by cold, and are therefore, perhaps, but rarely met with.

XI. Though we must allow, that it may probably ever remain in a great measure impossible for people to de-

termine, in every instance, the precise quantity of milk which these animals will produce from their external form, yet we imagine there is not the smallest ground for hesitation; but that by carefully attending to these marks, as above pointed out, some pretty just judgment might generally be formed of the quantity, and perhaps also of the quality, of it: and this will, we apprehend, be most readily attained to, by punctually and carefully attending to, and comparing the particular appearance of different kine, some of which are previously known to milk plentifully of a rich quality, while others of them are also known not to do this.

XII. Any judgment formed from the appearance, must necessarily be under some limitation; because it has long been observed by farmers, that one cow will give a greater quantity of milk than another, tho' both of them appear equally well shaped and milk-like: therefore, although the quantity of milk that animals give, may be

with some tolerable certainty ascertained from observing the shape of the individual animal ; yet the real quantity of milk any one cow will give, can only be determined by comparing the quantity of milk which one gives, with the quantity given by another: for the quantity of milk which a cow will give, may be increased or diminished from the mere difference of the nature of the pasture they may have for some time been fed upon, that there is no judging with entire certainty, but by comparing the quantity of milk which one cow gives, with the quantity given by another, while they are both in similar circumstances.

XIII. But farther, it would appear from the difference in the quantity of milk different cows give, while they are under exactly similar circumstances and of a like character, that there is something in the nature of individual animals occasioning the difference, as to the quantity of milk they are observed to give, but which we are not yet acquainted with ; and which, if

ever discovered, must be by careful observation.

XIV. Young cows seldom or never milk so well in their first year, nor even in their second year do they often milk so plentifully as they will do afterwards.

XV. Old cows because they become somewhat unfit for searching for their food, particularly if they have occasion to travel very much in gathering it, seldom milk so plentifully as young cows would do upon the same field.

XVI. The incisores or fore-teeth of old kine frequently become so very short, and perhaps also painful, that from this very circumstance alone, they are often rendered, in a great measure, unable to gather food for themselves in sufficient quantity, and of course fail in milking. This most commonly happens only to such as have been long accustomed to feed upon light or very short grass growing upon a gravily or sandy soil.

XVII. Some say that if cows are allowed to feed any considerable length of time upon grass on which lime has been spread, it proves injurious to them, and they become unhealthy from that cause.

XVIII. Cows never milk so well when very lean as when moderately fat, nor for some time after it.

XIX. Cows milk more plentifully when newly calved, than at any after period, if properly fed, for as the time of their calving elapses, the quantity of their milk is gradually, though slowly, diminished, notwithstanding their feeding should be uniformly continued from that time.

XX. This natively leads us to observe, that, the same animal calving in November in one year, in January in another, and April in a third, will, though equally fed each year, give a proportionably larger or less quantity of milk in the succeeding summer, as she is shorter or longer time calved.

XXI. Moreover, if we consider that the gain derived from the keeping of milk kine, will always be, in some measure, in proportion to the quantity of the milk which they do produce. The utility of farmers studying to have their farms properly stocked with a good breed of milk cows, must undoubtedly appear very conspicuous, particularly to people situated in a country abounding in grass, and not fit for bearing heavy crops of grain.

XXII. In such a country, more money can be raised from well feeding a proper number of milk kine, at less risk, from inclement seasons, while the high expence of finding men, and maintaining horses may be at least partly saved.

XXIII. Therefore, we are fully persuaded, upon some farms at least, a very considerable share of the farmer's attention ought to be paid to the management of milk-cattle, especially those whose farms produce plenty of grass.

XXIV. It can scarcely be thought unnecessary to observe that very particular attention should be paid to what kind or breed of bull should be kept among cows. This circumstance, trifling as it may seem, undoubtedly deserves singular attention.

XXV. It has already been hinted, a farmer should always stock with cattle of the size which may be known best to suit the soil and situation of his farm, and the purpose he designs with them.

XXVI. It happens now and then that a farmer will choose to have his stock of milk or of other black cattle rised in size; particularly when he has by long resting, well manuring, or from properly inclosing much improved, not only the quantity, but even the quality of the grass upon his farm; in case too he has removed from a farm of light coarse grass to one of the opposite kind; or if he has come to understand that he will derive

more benefit from stocking with cattle of a large size. Lastly, if a stock of cows is found to have degenerated in size from having kept a bull of an under size, or from having been poorly or sparingly fed, or from whatever cause. In such cases, a farmer will find it much to his interest to improve his stock in point of size. The question then is, How may this be accomplished at least expence, and in the shortest space of time? There is no doubt a farmer may procure for money cattle of any size to be found; but the industrious farmer may find it inconvenient to dispose of his whole stock of cattle, as well as too expensive, all at once, to find a stock of cows of the size he inclines to have them of.

XXVII. In order then to improve his stock in size, some less expensive and more convenient means are requisite to be fallen upon, which can be accomplished in a gradual manner, at a trifling expence, though longer in accomplishing.

XXVIII. The breed of cattle, as to size and shape, may be mended by finding one or two cows and a bull, each of them of the size the farmer inclines to have his stock of. By upbringing the calves of these cows, while kept, by such a bull, in process of time a whole farm may be stocked at a small expence. This mode of rising the stock of cattle in size like the purchasing a stock all at once appears evidently defective in respect of the length of time requisite for accomplishing a complete change in this manner, though very entire or perfect, when once accomplished. But we imagine, but few in this place of the country will be found fond of having their stock of cattle of the largest size to be found in Britain; while not a few may be found inclined to have the breed of their cattle somewhat rised in size. If this is all that is wished for, as will more frequently be the case, it may very conveniently be done at a small expence, and be accomplished in the course of three or four years at the ut-

most: namely, by finding a bull of a size sufficiently large for rising the breed of cattle to the wished for pitch.

XXIX. It will readily enough be understood, That cattle sprung from a large bull and a small cow, will be only of a mean size, viz. neither so large as the bull nor so small as the cow from which they sprung. Every one of ordinary intelligence will be more ready to fall in with this very frugal, yet effectual manner of improving the stock of black cattle with respect to either size or shape, or both, than either of the former.

XXX. Animals of every kind produced of a male of a large size and a female of small size, being always of a middling breed between the two, are commonly termed half breed, broken breed, &c.

XXXI. This manner of rising the breed of cattle, particularly of black cattle, should be much more generally

and frequently practised than has hitherto been the practice in most parts of North Britain, in order to preserve a stock in proper shape and size. Now it will be fully understood, that it is only requisite to procure a bull occasionally of a proper breed, on purpose to preserve the stock of black cattle from degenerating, a bull of the best breed should always be kept among cattle, or when such should be got to them?

XXXII. We frequently observe, that the farmer who pays the strictest attention to the breed of his bull, has his stock of cows of the nicest kind and properest description.

XXXIII. Of the many useful animals in the world, there are none perhaps more useful and profitable than black cattle. Due endeavours then for having them of the properest size and character, in every possible respect suitable to soil and situation, cannot fail of being an object of utility to society,

and of practical inquiry and observation to farmers and store-masters in every nation, while food and clothing are in daily use.

XXXIV. Farther, the age of a bull should be from three to nine years old, and he ought to have descended or come from a proper sized and well shaped bull, and a well formed cow and a good milker. The whole parts of the animal should be in due proportion to one another in regard to size, of a length proportioned to the thickness, rather round than deep in the body, with legs moderately short, thick and full of sinews, with joints neither thick nor long, except the knee-joint, which if round, large and straight, is considered ornamental. He should be a firm, steady walker, with feet well spread. His head ought to be short, and broad at the horns; the nose short and narrow; the ears long with horns of a moderate length and thickness, of a black colour, well set and shaped: thick, fleshy necked, with

broad breast and thick shoulders; straight backed : thighs full and fleshy ; well tailed, with much hair on it ; skin thin and soft, but thickly covered with fine soft hair, not very long, but twirled about the ears, horns and forehead.

XXXV. As connected with the breed of cattle, it may be noticed, that it has been remarked, the calf of a well milking cow, when come to age, generally proves also a good milker. It is not certainly always so ; but since it has been said, ' like daughter, like mother,' it may frequently prove true. The calves of kine of a good kind, in respect of their well milking, should therefore be preferred as more proper for upbringing than the calves of other cows, though otherwise of equally as good a breed.

OF PASTURAGE.

XXXVI. **I**T is a thing, as was formerly said, sufficiently known, that the kind or nature of the pasture on which milk-cows are fed, has very considerable influence on their milking; infomuch, that six cows fed on some pasture-grounds, will produce as much milk as nine, or even twelve will do, which are fed on worse pasture. Which may serve to shew the utility of having cows fully fed, rather than always studying to keep a precise number whether well fed or hampered.

XXXVII. Although, therefore, the farmer may not always have it in his power to obtain a farm to his mind, with respect to fitness for pasturing milk cows. The farmer, however, who intends to prosecute the business of feeding milk-cattle, with either

pleasure or advantage, will find it his interest to attend particularly to the quantity and quality of the grafs these lands, on which his cattle are to pasture, do produce.

XXXVIII. Though lands can be improven by various means; yet lands which are capable of improving themselves by being allowed to rest for the space of four, five, or even six years, cannot, we imagine, be improven by any means at a cheaper rate, than by resting; particularly lands which produce a tolerable quantity of grafs. Same time milk or other cattle can be got fed upon the lands all the while they are a resting and improving; in some places it has come pretty universally into esteem and custom, to allow two-thirds of a farm to rest, and to labour one-third only; at first this method of treating land was, in speculation, thought to have been injurious to farmers, but from experience it has been found far otherways; especially to those well seen in the management

of milk-cattle and their produce. John Campbell late Earl of Loudon, a nobleman, not more memorable for his private improvement of the agriculture of his native country, than his martial atchivements on foreign expeditions, and as a statesman at home, was one who foresaw the utility of this practice, and accordingly fully established the resting, of lands among the farmers upon his estates in Ayrshire, by confining his tenants to allow two-thirds of their farms to rest continually, and to labour one-third only.

XXXIX. Notwithstanding where lime and dung are easily procured, and at command, and the lands are found but little improven by resting, and still more so if the lands bear slight crops of grafs, in such cases it will be less profitable, and consequently rather improper to rest grounds long at one time, or to so large an extent as two-thirds. We are fully persuaded, except in some singular rich soils as above, lands should be allowed to rest at least

three years, and laboured three ; but much rather rested four, and laboured three only ; because we are convinced it will be found from experience, that lands rested four years, will then produce as much grain in the three following crops after resting, as they would produce in four, if rested only three years ; and as much in three after having rested six, as if rested three, and laboured four or five. Another capital mistake, some farmers fall into, is keeping too many horses, whereby their grass in summer is unnecessarily consumed, and their fodder in winter, whereby they are prevented from keeping so many cows as they otherwise might do. In general a farmer never will be a profiter by keeping a greater number of horses, than is absolutely necessary for the purpose of working his farm, except upon coarse grass not fit for a more profitable purpose.

XL. In general, the greater the quantity, and the better the quality of the grass, so much better are they

adapted for cattle-feeding, in general; and in particular for feeding milk-cows, as they require a larger quantity of food to sustain them, than an equal number of other cattle do; and are much injured in their milking, if they are not sufficiently well fed, or if they are subjected to much labour in obtaining a sufficient quantity of grass.

XLI. The lands we may expect most grass from, and of the best qualities, are such as bear plentiful crops, of good grain, and are apt to become rich in soil, merely from resting in pasture alone; and further, are of a moderately dry soil, and not interperfed with watery or springy spots; such lands, at least such places of lands, bear generally a coarse kind of grass.

XLII. Several circumstances must therefore be evidently requisite to render a field one of the most proper and advantageous for feeding milk-cows upon.

XLIII. Three circumstances are more peculiarly necessary to render any farm or pasture-grounds properly fit for cow-feeding.

First, It is requisite that the lands or pasture bear or produce grass plentifully.

Secondly, That the grass be of a good quality.

Thirdly, it is requisite, that pasture-grounds should be low situated, well watered, and inclosed. But to be more particular.

XLIV. The quantity of grass, as was already observed, should be sufficiently plentiful; because no beast can be expected to milk plentifully, if not plentifully supplied with food. It should be plentiful, in order that it may be easily obtained in sufficient quantity, without occasioning them to have too much toil in gathering a sufficiency for themselves. The grass should be of a proper quality, and be well-liked by the cattle, and such as is found to cause them to milk plenti-

fully and rich. To answer these intentions, a field of grass, consisting of a mixture of Dutch clover and a very little rye-grass, is found to cause cows to milk exceedingly well, and is much liked by them: consequently, such a field makes one of the most valuable kind of pasture, or a field of clover grass alone. A field consisting of a mixture of Dutch clover and natural white clover, having interspersed among it a little rye-grass, constitutes a vastly valuable kind of pasture for the same purpose.

XLV. Even a mixture of common goose-grass and natural white clover amongst it, makes one of the best kinds of pasture of natural growth or produce of any in this country. And upon such a kind of pasture, if sufficiently low situated and sheltered, cows will milk pretty well. Cows fully fed upon any one of these kinds of pasture-grounds, are found to be very profitable; and the finer the pasture is, the more so.

XLVI. A variety of kinds and species of grafs, or herbage, are generally to be met with upon almost every pasture-ground. All of these put together, seldom make the one half of the growth found upon any field, goose-grafs excepted: whereas commonly goose-grafs constitutes, at least, the greatest part of growth found upon every field in this country. Sometimes, however, it is otherways, particularly upon fields newly laid down.

XLVII. Cows are observed to be very fond of feeding upon lea when newly laid down. This may be owing to the new lea-grafs being sweeter than grafs upon old lea, or to the grafs being particularly clean of old withered grafs. Some say cows milk better when fed upon new lea-grafs, and also give the richest milk: but this does not appear to be true. Others on the contrary say, that cows fed on old grafs, give milk in the greatest quantity, and of the best quality. If it be true, as we imagine it is most probable, that cattle

fatten best upon old grass, so we think it probable, that they give milk both in greatest quantity and of the richest quality, when fed upon old grass. This opinion will be found just and merits attention. It may, perhaps, be the most proper method, with regard to milk cows, to allow them to feed upon old and new grass by turns, when both are to be had.

XLVIII. Our limits do not permit us to go farther, or we might give some account of the probable causes, why one kind of grass makes cows milk better than another; and how the qualities of milk come to be so much varied from the nature of the food the animals feed upon.

XLIX. Pasture grounds should be sufficiently inclosed and properly divided. Considerable more gain will be found to rise from feeding milk cows in proper inclosures, above feeding them upon other fields. Cows, when allowed to feed in improper inclosures, have no

temptation or occasion to travel beyond their pasture-ground, which some are very apt to get into a custom of: Whereas cattle, when confined with proper fences, generally gather their food more quietly, without being subjected to any disturbance or toil. Cows, when they get into a custom of strolling over their pasture, are apt to run to growing corn, and are often, on that account, subjected to much unmerciful beating from their keeper. Thus milk cows are more frequently abused by beating with stones, hunting with dogs, and the like, than is well known to their masters. Such practices cannot fail to be extremely detrimental to milk-cattle.

L. It cannot be far out of place nor improper, to take notice that the practice of daily far driving cows to their pasture-grounds, has been found, from observation and long experience, to prove very injurious, both as lessening the quantity and vitiating the quality of their milk. Therefore farm-houses

should be placed at the middle of the farm for this and several other obvious reasons.

LI. Lands situated considerably high above the level of the sea, owing to the atmosphere being pretty light upon such high places, are found to be much colder than lands upon a lower situation: For this reason, low situated farms, being warmer, are preferable to those of a high elevation.

LII. With respect to fences, any kind that may be readily obtained, if sufficient to confine the cattle, does equally well. Upon stony and poor grounds, scarcely able to bear thorn-fences, stone walls do best; but upon good land, thorn-fences do very well: but we think much labour and expence is lost in many places, by putting up ditch fences with thorns, where the soil is not able to grow them, so as to turn any way useful.

LIII. Every pasture ground should

be sufficiently supplied with water, whether inclosed or open: or the cattle should be watered three or four times each day, at running or spring water.

OF HOUSE FEEDING.

LIV. **I**T is a very advantageous custom, and common in most parts of this country, where cow-feeding is properly conducted, to feed cows with grafs in the house, at each milking times, which is twice a-day. Some allow them to be eating their grafs when a-milking; but others think it more convenient to give them their grafs immediately after milking, and say that cows are more troublesome when a-eating their grafs in time of milking.

LV. Clover and rye-grafs make the best feed for cattle at milking-times. The greatest number of farmers, however, feed their cows, when in the house, with common goose-grafs, taken from a barn-yard, or the like. And, indeed, cows very readily eat such very freely when in the house;

though, if at liberty in the field, they would not, if not grown upon too rich ground, near a dunghill, or the like.

LVI. Some farmers are in use to plant a great number of green kail or cabbage, on purpose to feed their cows with at milking-times. Of this kind of food milk-cows are very fond, and milk plentifully when fully fed with them: but this kind of food is exceptionable, at least cabbage-kail, because the butter produced from such cows milk as are frequently, or most ordinarily fed with cabbage particularly, has been observed to be of an extraordinary white colour, and never appears of a fine gold colour, as good summer butter does. The practice of daily feeding cows properly with house-meat, even in the summer season, cannot well be sufficiently recommended; the cautious bestowers on milk-cows in this manner, will always be amply rewarded by the animals themselves; and therefore the custom stands not in need of any recommendation, but to those

who know not the utility of this practice. It is not a feeding cows with house meat one day, or one month only, that we recommend, but would have farmers to be punctual in feeding cows every day, at each milking time, with grass all the summer round. In order to this, we would have farmers, who may not have much garden-ground, to inclose one half acre of good land near by the farm-house, and sow clover-seeds upon it, and repeat the sowing of the seeds occasionally, and dung it every third year just at Martinmas; and, if good land, and well dunged but every fourth year, it will afford grass sufficient to serve ten or twelve cows all the summer.

LVII. But, farther, in the winter-time, it will be found of consequence, particularly to those who intend to raise good veals, or fatten calves, to be very careful in feeding their cows, even in winter with fodder, potatoes, or turnip, and also with weak corn, chaff, and such like barn off-fallings in the

beginning of summer, before grafs be grown up fit for cutting.

LVIII. Further, with respect to the use of potatoes and turnips, it remains to be observed, which ever of these roots are employed in feeding cattle, they should be cleared of adhering dirt, and cut into pretty small pieces. A due proportion of either of these may be given to cows twice or thrice a-day, without any addition or combination whatever: yet, some farmers consider the adding a due proportion of small corn, barley, or oat dust, chaff, or even of shilling-seeds, a very needful, beneficial, and proper addition to each of these articles, for the use of milk-cows. Upon farms of a light, sandy, dry soil, whether high or low situated, it will generally be found that potatoes may be grown in the most considerable quantity, and also of the best quality, provided the lands on which they are set are moderately rich in manure.

LIX. Turnip, again, may be grown in greater quantity upon clay and mossy farms, if the soil be true, and full of dung, or lime and dung. Potatoes deserve the preference, as they cause cows to milk better. Turnips are often less expensive in raising; the preference of the one before the other, must therefore be left to the judgment of the ingenious farmer. When both are on hand, turnips may be used early in winter, as potatoes may be more readily preserved till latter in the season.

LX. I have just been informed by a very intelligent farmer, that he has observed his cows to give more milk, when fed with potatoes unboiled, than when boiled; and he thinks the same will hold good with respect to corn, chaff, &c. Though cows are generally fed with oat-straw only, in many places of Scotland; yet it is the thing every farmer knows, that cows milk better and richer, when fed with good bog-hay, hay of natural grass, or with

clover-hay, or with a mixture of clover and natural grass in hay.

LXI. Lastly, Some farmers give their cows daily a small proportion of beans and pease, broken down in a mill, to the extent of one boll a-week, to six or seven cows. It may be particularly necessary to feed cows well, in order to produce plenty of milk of a rich quality, for the purpose of feeding calves with; and, as was said, it may not be amiss sometimes to allow cows such feeding, to cause them milk well in the beginning of summer, when the fields are lightly clothed with grass.

LXII. Too many farmers imagine, that the greater the number of cows they can keep alive upon their farms, the more profit they will derive; whereas, almost the very reverse will be found, from observation and experience, to be the truth. To us it appears sufficiently evident, from what we have heard, and been able to observe, and any body may do the same, if willing

to believe sufficient evidence, that at least the one half of farmers in this part of the country would derive a fourth, fifth, or sixth part, nay, in many instances, I might, in fact, say, the one half more profit they would bring from their farms, provided they would give to four or five cows the same quantity of food, through the whole course of the year, which they make seven or eight to live upon: besides all this, they would have less toil, and more pleasure in seeing their cattle well fed, than in hearing them continually crying for more food, and not enough to supply them with to be found. But, after all, it is not in any one's power, to put men off their old manner of doing, even by the most able arguments, nor by the most conspicuous and obvious facts which may be laid before them, though to their own advantage both to believe and practise them. Such is the power of inveterate custom and habits.

OF LAYING OUT MILK-CATTLE
AT NIGHT IN SUMMER.

LXIII. **I**N not a few places in the west country, farmers who have proper inclosures, are in use to send out their milk-cows in the evening, in order to lye out upon their pasture grounds all night, during the whole course of the summer season. This is another circumstance, respecting the management of milk-cows, well worth every farmer's attention. As far as I have been informed, those who have made trial of both sending out milk-cows, and of housing them, at night, universally allow, that kine, when allowed to lye out all night, milk better than when kept in the house. Some farmers observe, that their kine do not begin to mend properly in their milking in the beginning

of summer, till they are put out to the open field at night,

LXIV. We are, therefore, persuaded, that whoever makes the trial of sending cows out to the field, at night, will find it to their profit. And we think the practice ought to be universal, except where the situation is very high and cold, or much exposed to the winds, without fences or shelter, and in uncommonly cold and wet seasons. When cows lye out on their pasture all night, they have an opportunity of eating grass at pleasure, soon or late; nor are they hampered in a narrow house. They have a purer atmosphere to breathe in, less subject to vicissitudes of heat and cold. In the beginning of summer, when cows are first put out at night, the season should be temperate, rather than stormy, at the time; as they will be liable to catch harm at first, if the nights are very cold and wet, though not afterwards, though much colder.

LXV. All that is necessary to afford opportunity for farmers to put out their milk-cows at night, are proper inclosures. Those who already have inclosures, should make this use of them: and, as there is scarcely any place, or farm of any considerable extent in this country, in which there are neither stones to raise fences with, nor lands able to bear thorns, so as to become fences, if properly managed. In a few years fences might thus be got, in almost every place; at least as much land might be inclosed as might be sufficient to allow milk-kine to lye out at night in summer. When cows lye out at night, it is said to be of no great importance whether they get grass at milking times or not; but if the grass be light upon which they pasture, they will be the better of grass given them at milking times.

LXVI. It is not my intention at present to say any thing respecting agriculture. But, since it is not every piece of land that naturally bears grass plen-

tifully, on being laid down for pasture ; it must be of some importance to know by what means such defect, may be, in some measure, supplied.

LXVII. Clean bare lands (for so are such commonly termed which bear grass sparingly, particularly on being laid down in grass or pasture) may, generally, be improv'd at a very small expence, in comparison with the profits arising from the practice, just to be recommended.

LXVIII. To remove, as much as may be, this natural defect, let such farms, or parts of farms, as are bare and clean, or naturally bear but a small quantity of grass on being laid down in pasture, be sown with rye-grass and clover seeds, or even with rye-grass seed alone, if clover is judged improper, or too expensive. These seeds should be sowed upon the lands in the latter end of March, or in April, when the last crop, previous to the intended resting, is upon the ground. If lands

happen, unexpectedly, to fail in bearing grass, when laid down in pasture, owing to their being too rich in manure, or to their having borne a heavy crop of grain the preceding year, or to whatever cause; in such cases, grass seeds should be sown upon such lands in the beginning of the spring season, or at least early in the summer in which they are in pasture. And these lands, when thus sowed with clover and rye-grass seeds, should be gently moved by harrowing and rolling, that the seed may get into the earth.

LXIX. This is a practice, or piece of œconomy full of advantages to the farmer, and would undoubtedly be in general practice, if the utility of it was more known and experienced: for there is scarcely any land so poor, but it will bear a considerable quantity of grass when sowed with grass-seeds, tho' otherwise, upon account of the want of roots, the land could not bear any considerable quantity of grass for some years at least.

LXX. Conversation is one of the several means, by which knowledge is daily communicated, and one man can be profitable to another, in their respective callings, arts, and employments: therefore we are disposed to believe the state of agriculture in Scotland might be farther improv'd by this mean. And we imagine there is not the least plausible objection could be advanced, why farmers should not, by freely conversing together upon the subject of agriculture, be helpful to one another, as well as those of several occupations, by each relating their particular manner of practice, upon lands of divers soil, situation, and the like, in different seasons, with the result of their experience and observations upon each. By these means, each would become possessed of one another's experiences and observations; and, as errors, misapprehensions, and vulgar prejudices, were removed, they would get into the more sure light of experience and observation to go upon in practice. We are persuaded, that it would be ex-

tremely useful to the farmers of each parish, or adjacent situation, to form themselves into a society for this purpose, and meet at some stated period, as once each month: and it would also be found of surprising advantage to each such society, could they send one or two of their number to Edinburgh, for studying agriculture, although it were but for the space of one season; by which means they would become masters of an extensive stock of useful facts and observations, and they would be exceedingly enlightened with regard to both the theory and practice of husbandry, ancient and modern; all which would be found of the utmost practical utility, as well entertaining to the mind.

LXXI. It is a great loss to farmers in this country, that good books on agriculture or farming are so little read and attended to. We imagine there is not a farmer, possessing half a plough of land in all Scotland, but would be able to derive more than ten times the price of the best book to be found on

agriculture, and be sufficiently recompensed for all his pains. Besides, it may be observed, that there are many farmers, and of no great wealth, who make no manner of scruple to purchase volumes of songs, plays, romances, and what not, while they would grudge to lay out a guinea, or the half of it, to purchase some proper books on agriculture, which, if properly attended to, would prove the best laid out money they ever spent in their lifetime, on any human writing upon temporal affairs.

OF A COW-HOUSE, DAIRY, OR BYRE.

LXXII. **M**ANY farmers have so very narrow, short houses, thickly covered with thatch, for their milk-cows, that commonly in the summer, they will almost all of them be in a sweat every morning: in which state, they are sent out to their pasture-ground in a cool atmosphere. Kine can scarcely escape being hurt from exposure, when in this state.

LXXIII. It is therefore highly requisite, that farmers should provide themselves with sufficiently large cow-houses, dairies, or byres, for the reception of their cattle with ease and freedom.

LXXIV. A dairy or byre should not be less than fifteen feet wide within the walls, for cattle of the smallest size, and seventeen for the middle size, and eighteen, or rather more, for the largest. And the length should be according to the number of cattle intended to stand in it. Farmers, who are pretty intelligent in managing cows, have all their cow-houses divided into stalls or trevices. Thus, they set up one stone about three or four inches thick, four feet long, and three broad, upon its one end, one foot being in the ground to hold it firm. Then they fix up another stone five feet distant from the first; and so on, through the whole byre. Into each side of each stone, an iron chain is fixed, to which one animal is bound; so that between every

stone and its neighbour, two cows stand bound. It will scarcely be adviseable to bind one cow with iron, and another with a rope, lest one of them break loose and destroy the other before it be relieved. The manner of fixing cows in the house is well enough known to every body.

LXXV. A pretty large byre is preferable to a small one, on two accounts at least: 1st, The cattle are much better, because every animal agrees better with a medium either of heat or cold, than an extreme of either. 2dly, On account of the ease and freedom with which cattle are got fed, milked, and cleaned, in a roomy byre or dairy, beyond what they can be in a small, confined one.

LXXVI. What is termed the GRIP, or place for the dung to fall into in a byre, should be two or three feet wide, but not above five inches deep. It should be caufeyed with small stones, lest cattle hurt themselves by sliding,

when the stones are too large. Tile or thatch do very well for covering a cow-house. If covered with thatch, it ought to have openings or ventilators at the top or side, open in summer, and shut in winter.

OF THE QUALITIES OF COW'S MILK.

LXXVII. **T**HE quantity of milk is not perhaps much more diversified from the nature of the animal, or from the quality of the pasture on which they are fed, than the qualities of their milks are diversified from the same circumstances or causes. Thus, cows not only give different quantities of milk, but are found even to give milk possessing considerably different qualities. What we mean, is, that one cow's milk may contain a larger quantity of the butyraceous or oily part of milk than another's will do. Another

cow's milk will possess a greater proportion of the cheesy part of milk, in proportion to the butyraceous part it contains; and another cow's milk will be found to contain a much less quantity of each of these in a given quantity of her milk.

LXXVIII. Besides the above variation, with respect to the butyraceous and cheesy parts in milk, there may be a pretty considerable variation not unfrequently to be observed to take place, with regard to the quantity of the serum or whey it contains, the effect of, and in proportion to the variations in No. 79. Milk also is sometimes found of an unpleasant smell, and of a disagreeable taste; whereas milk should be of a sweetish taste, and almost without any smell.

LXXIX. For want of facts to go upon, we cannot determine in what proportion the butyraceous and cheesy parts of milk are most commonly to be found, in regard to one another.

The cheesy part will be found to exceed the butyraceous part by one-half to one-third in general; though, from various obvious circumstances, it must be greatly varied.

LXXX. For, upon a fair experimental trial, it will be found, that the same quantity of some few cows milk will contain in it, at least double the quantity of the butyraceous part which some others will do. So very great variation in the richness of milk, as that just mentioned, is perhaps the widest, and but rarely to be found. Less considerable variations are frequently enough to be met with. This difference, however, in the qualities of cows milk takes place, though the animals affording the milk are of the same character and age, under the same management and feeding in every respect: therefore, it would appear, that this difference in the richness of the milk of sundry animals, proceeds from something peculiar in the constitution of the animals producing it. Wherein this

peculiarity consists, we do not pretend to know. It is not more certain, than that it may be improven, in various cases, that animals of this kind afford milk of various degrees of richness, from a number of different circumstances.

LXXXI. As a proof and instance of this, it may be observed, that cows, for the space of some few days after calving, afford thick rich milk, but after this, their milk becomes thinner, containing only a small quantity of oily or cheesy matter; and, from a month after calving, or thereabout, their milk gradually becomes thicker, though lessened in point of quantity.

LXXXII. Farrow or drape cows too give thicker milk, when in that state, than when they have brought forth in the same season. But whether the thickness of milk is always an infallible sign or proof of the genuine richness of it, as to its containing a large share of the butyraceous part, we cannot

determine, though we are inclined to be of opinion, that it is not universally so. Yet we are fully persuaded, thick milk will always be found to contain a larger proportion of either cheese or butter, or of both of them.

OF EXPERIMENTS FOR ASCERTAINING THE RICHNESS OF MILK.

LXXXIII. **T**HE difference of the richness of several milks may be pretty certainly ascertained, by a very natural and simple experiment. Thus, the richness of milk of individual animals may be comparatively examined, and ascertained with the greatest possible accuracy, by collecting the whole of each cow's milk, for one day or two; then, having allowed the milk to cool, pour it into a small churn, in which it may be wrought after having become a little sour in it, so as to cause the butyraceous part to

separate from the other parts of the milk; and, having properly collected and washed the butter, it ought to be accurately weighed; and so of every cow's milk which we wish to examine. In this manner having previously ascertained the quantity of the milk by measure, compare the butter each produces with the quantity of the milk from which each was produced, and thus you will have the precise quantity of butter each cow's milk affords, and the quantity in proportion to the quantity of their milk from which it was made.

LXXXIV. Again, suppose a farmer has ten cows, and wishes to examine the richness of each cow's milk. To do this with accuracy and certainty, let him take ten earthen or stone vessels, and fill each vessel with milk newly milked, equally free of foam, from each cow, until precisely six inches deep; then place them all in a cool milk-house or cellar for the space of twenty-four hours, by which time, we

suppose, the butyraceous part of the milk will have entirely risen up to the surface of the thinner part of the milk, which occasions the appearance termed cream of milk. Afterwards, let the milk in each vessel be cautiously and accurately tried, which of them has thrown up the thickest or stoutest cream upon the surface of the milk, in each of the ten vessels, in the following manner.

LXXXV. Having fixed to the end of a steel-yard or beam, by means of linen thread, a plate of silver, brass, copper, or the like, about four inches in breadth, and having upon the other end of the beam, as many small metal rings of half a scruple in weight each, as nearly to balance the plate of metal on the other end of the beam. These things being properly done, let the plate of metal be cautiously placed, and rested upon the surface of the cream in one of the vessels of milk to be examined; then, in the most cautious manner, take off these rings one by

one, until the plate fixed to the other end of the beam falls through the cream into the milk below it; observing how many rings were taken off, when the plate sunk through the cream in the first vessel; any one will perceive with how much acuteness and accuracy the experiment ought to be performed.

LXXXVI. Having wiped the plate clean with a cloth, and any part of the linen thread that was wetted in executing the former experiment; in the same cautious manner, let every one of the other creams be tried; for in this manner the comparative strength of the cream on the milk in each of the other vessels may be found out, on which we suppose the strength or richness of the milk depends. Always remembering, the greater the number of the rings are that were taken off before the plate sunk through the cream, the stronger was the cream, and of course the milk is the richer, and the greater quantity of butter it will produce; and,

on the contrary, if only a few rings were removed when the plate sunk through the cream into the milk, the poorer that milk is, and the greater quantity of cheese, though poor, it will afford in proportion.

LXXXVII. It may be necessary to observe, that, in order to obtain a clear and decisive proof in this matter, not only all the milk should be nearly of one age, or at least, that circumstance ought to be taken into consideration; but all the milk on which such experiment is made, should be either the first or the last part of every cow's milking at one time, as the milk that is first milked is thinner than the milk that is last milked. It is not only requisite in this kind of experiment, but also in the former, that the age of the milk ought to be considered; yet what consideration should be allowed for the age of milk, we know not, having never made any experiments, in order to ascertain this point, though it might easily be done.

LXXXVIII. The fineness also of the pasture on which the cows are fed, on which milk these experiments are made, should be similar, otherwise the experiment must be indecisive.

LXXXIX. By one or other of these experiments, but particularly by the former, may be found the richness of the milk, not only of individual animals, but also of the milk of similar cows under similar circumstances, on different, and even distant farms also.

XC. The richness of milk may be tolerably well ascertained various other ways than those just mentioned; as, by dipping into the milk a piece of black wood, a black spoon, or any thing similar, of a black colour; observing, immediately, on taking it out of the milk, of what degree of whiteness it appears upon the black substance. The richer the milk is, the whiter it will appear upon the black surface, on being taken out of it.

XCI. But what occasion have we to speak of experiments to detect animals that give poor or rich milk? Every active woman, experienced in the business of milking, and of working among cows, and their milk, will be found able, nearly, by observing the colour of milk upon a dark coloured milking-vessel alone, to declare, with pretty much certainty, whether the milk be thick or thin, that is nearly the same as rich or poor. By observing also the yellow colour, together with the thickness of the cream on a cooled vessel of milk, they will often do it with surprising accuracy.

XCH. It remains to be observed in this place, that there are some few cows, though their milk be found sufficiently rich, yet the butter their milk produces appears uncommonly white, and rather too soft. This fault can only be surely detected, by making butter of each cow's milk separately, or by itself alone. In such experiments, the churning should be cautiously per-

formed, left by too brisk churning, the colour and consistence of the butter be changed from what it otherwise would be.

XCIII. It is an unquestionable truth, that in towns and villages, considerable quantities of water are put among sweet milk, and sold for it. This is a species of theft or robbery, not yet sufficiently looked into, either by individuals or magistrates. Chalk is likewise said to be sometimes ground, and sold mixed with milk, to cause it appear rich-like when very thin or watered.

OF FEEDING AND FLESHING CALVES.

XCIV. **T**HE feeding and fleshing of calves may be taken in different senses or acceptations, according to the purpose more immediately intended by them. As calves

may be said to be fed, and to have flesh enough for one particular purpose, as for being brought forward to nolt; whereas others, which are intended to be slaughtered at the age of two or three months old, could only, in this case, be said to be fed and fleshed, when they had acquired a much greater degree of fatness at that age. Feeding and fleshing, for the latter purpose, is that which we mainly intend at present.

XCV. In this country, except in a few counties, the properly feeding and fleshing of calves for the market, hath hitherto been but too slightly looked after, and consequently little practised; and so, of course, little benefit derived from it, or looked for. For, in the most of places, the farmers universally allow their calves, even when intended for the market, to continue sucking their milk from their mothers: and this is so general, that not one farmer of five hundred, in many places, does ever entertain the most distant thought

of putting their calves upon any other cows to get milk, than their mothers, in any manner whatever.

XCVI. People accustomed to the above manner of practice, are found extremely well satisfied therewith, and they do alledge that it is the best mode of doing with calves, to continue them at sucking their mothers, until these calves which are to be put to the market cease to become any fatter thereby, and then to sell them at what they will bring in the market, though it should happen to be but ten, fifteen, or twenty shillings Sterling; and those which are intended for upbringing, then, gradually, to put them upon fodder. This scheme we can in no-wise approve of, particularly on account of the reasons shortly to be advanced.

XCVII. The above, though the common mode of practice appears to us to be attended with no inconsiderable number of inconveniencies, and

singular disadvantages; some of these are, indeed, in our opinion, and in fact, insurmountable obstacles, in the way of getting calves well fed; because it will be found, upon the strictest inquiry, next to an entire impossibility, to get them fully fed in that way, and, of course, in the way of getting them fleshed, in what we are inclined to consider the properest manner, and to the full extent.

XCVIII. Though calves may, without almost any limitation, be fully fed and fleshed, suitable to their age, by sucking their mothers during the space of the two or three weeks immediately succeeding their mothers calving; yet it must be observed, that so soon as ever calves come to exceed above twenty days old, longer or shorter, according as their mothers do milk more or less plentifully, they cannot be got sufficiently fed with their mothers milk alone, in order to be well fleshed, because the quantity of their milk must be too small, and therefore inadequate

for this purpose, except in instances where the mothers are uncommonly well fed; in such cases, calves may be sufficiently fed, perhaps, until four weeks old. Such kine, as will feed them longer, are but rarely to be met with, unless fully fed upon grass.

XCIX, Another reason why calves cannot be gotten properly fed, nor fleshed, to any considerable degree of perfection, with the milk of one cow alone, is, because these creatures do not, usually, under the age of four, five, or six weeks old, readily become fat-fleshed; at least, they do not become so particularly fat-fleshed, as they frequently will do after that period, if properly fed; and before they arrive at this age; one cow's milk, unless uncommonly well fed, as above said, will not then be in sufficient quantity for that effect; nay, perhaps, scarcely fit to sustain them for well upbringing, how much less sufficient for well feeding them, so as they may become properly fleshed.

C. And while the farmers, as was said, do universally allow their calves to continue sucking their mothers, even when intended for the veal market; in that mode of conducting the business, they cannot conveniently be got given any more milk than their mothers give to them; and though they would give more to them, they certainly will find it a very arduous task to cause them suck milk from any cow which they please, when come to the age of two or three weeks old: and, perhaps, not much less so, to make every milk-cow, at their pleasure, suffer any other, than her own calf, to suck her milk, unless put upon her when she is newly calved, and the calf very young too.

CI. Moreover, farmers not unfrequently happen to have other milk-kine beside those which have calves upon them; which cow's milk, the husbandman, we suppose, never can dispose of to so good advantage, in the winter season, as either in veal-feeding, or by the measure; they who enjoy

the latter opportunity, will not find it to their interest to prosecute calf-feeding, though the former certainly must.

CII. Although that it may appear to those entirely ignorant, and unacquainted with the full extent of this business, and to those but little experienced in it, most eligible, on first consideration, to allow those calves to continue sucking their mothers, which can have no more milk given to them than their mothers do afford; yet, seeing it hath been observed by some farmers, who have tried both of these ways, that milk-cows ordinarily fall more away in flesh, or, in other words, are more hard to keep up in flesh, while their calves are allowed to continue sucking, than when they are taken quite off from sucking them, and kept out of their view. This observation will, we apprehend, be found well grounded, and may, we think, be reasonably accounted for, from the wasting nature of the care and concern, (if we may

so express it,) which the mothers of this kind of animal are naturally, and for wise purposes, endued with by the CREATOR, and exercise towards their young ones while confined near them; yet, at some little distance; if their calves were at liberty, their care and concern would be less considerable, and so would, we think, be found not to have any such baneful effect. The above inconvenience, we consider as a sufficient reason, wherefore calves ought always to be taken off from sucking their mothers.

CHII. Though the neglect and mismanagement of the business before us, in several respects, may be partly accounted for, and owing to different local circumstances, as the distant situation of some places from a ready veal market, and the small price veal-meat would bring, even when brought to the market; yet we are rather inclined to imagine the so general neglect of feeding them, in the fashion which they ought to be, and the fleshing them

to the extent they are capable of, and to which we would wish earnestly to recommend it, may, with more propriety and justice, be imputed to the want of knowledge and experience respecting this, and also to farmers not knowing the singular ascendancy with regard to the superior extent of profit that might reasonably be expected and obtained, from conducting this branch of husbandry in the proper manner, and from carrying it to all that extent in practice, and in that state of improvement to which it is now brought by many in some places, particularly in several counties in the west and south of Scotland.

CIV. Calves are not unfrequently fed by those who well attend to feeding them in the winter season, until they bring from one pound ten to three pounds, and even four in a few instances, while people in other places remain quite unacquainted with feeding them to this extent ; yet are possessed

of the same means for accomplishing it, were they improven.

CV. Therefore, in order to be as entirely disintangled from the inconveniencies, accompanying calves being continued upon their mothers as possible, those who are accustomed to feed them, until they become very large and fat, do this, by giving them as much milk as they will take, and never allow them to continue sucking their milk from their mothers, but take them off from sucking them, so soon as they are well learned to suck them; or, if they appear to be quite lively, they chuse rather never to allow them to suck their mothers at all, but even, when newly calved, begin to learn them to take their milk by laping it; and this they do in the following manner: *For example;*

CVI. The calf being learned to suck milk from its mother, or appearing to be apt to do it; if so, the calf will be fond of sucking almost any thing

presented to the mouth of it. When it has become somewhat hungry, from having fasted some two or three hours, they present to the calf's mouth the first and second finger of the right hand, well cleaned; these the calf very readily takes hold of, and sucks them very keenly; while the young creature is thus employed in sucking the fingers, having previously gotten some milk in readiness, which they hold with their left hand directly under the animal's mouth; and, by degrees, while it is sucking at the fingers, they let their hand lower and lower, until it is placed in the milk, yet not deeper in it than is absolutely needful for getting the milk laped, because, if the hand shall happen to be placed too deep in the milk, the calf's nostrils will, of course, be stopped with the milk, and, consequently, it will immediately be out of free air, the thing so absolutely necessary for every living creature; and so, of necessity, it will be obliged to give up with sucking the fingers, and withdraw its mouth. This

circumstance should be particularly attended to, in teaching these creatures to lap: if the young animal now continues sucking at the fingers, properly placed in the milk, in the above manner, it will get milk readily enough until satisfied, or the milk comes to be all taken up in this manner; however, it doth not unfrequently happen, as the hand is lowering down into the milk, or after it is placed in it, even in the most cautious manner, the animal, it may be, will let go the fingers; yea, though the calf shall have gotten some milk in that way, it may do it; if so, the hand must be taken out of the milk, and the fingers presented to the mouth of the calf, as at the first, again it sucks them, when the hand must be lowered as before; perhaps, it may be, it will let them go again and again several times in the first two or three trials: in every such case, the attempt must be renewed repeatedly, until the calf takes in so much milk as will be sufficient for its support for some time at least; if it shall take but a small

quantity of it at one time, it will be sooner necessary to offer it some again in the same manner. If once a calf has been but a few times accustomed to take milk in this way, it will always afterwards be found to take it very readily; and it is only in a few instances where the calf is not very good at sucking, that there will be the least difficulty even at the first.

CVII. Young calves should have milk given to them three times every day. When above three or four days old, twice each day will be sufficient. However, some judge it most proper to give them milk three times each day, especially when they have become pretty fat; and this, we think, should be punctually attended to. The usual times of feeding them, are at nine in the forenoon, and at nine in the afternoon, except when they get milk three times a-day; then the day ought to be divided into three equal parts.

CVIII. And, in general, the amount of

that which we have advanced upon this subject, is, that, if calves are not accustomed to take their milk by the mean of sucking the fingers, or the like, they must be unavoidably confined to the use of their mothers milk, however poor it may be, or however much benefit this might be productive of, or to whatever trifling account, in comparison of that, milk must be otherwise unavoidably disposed of: neither can the anxiety be removed which their mothers suffer on their account: whereas, if they are taught to lap, in that case, they can be conveniently enough allowed any quantity at pleasure which they will take, if to be had, and that of the richest kind, equally, as readily as the poorest; and any farinaceous or meally substance may be occasionally given to them, diffused among their milk, if found requisite.

CIX. The practice, then, of learning calves to lap their milk, must certainly be often of singular benefit, above the general custom of allowing

them to suck it from their mothers; and that may indisputably be profitably improven in various instances. To enter more fully into a particular detail of the sundry circumstances, wherein the having them taught to lap, will be found preferable to the common custom of continuing them upon their mothers, would be tedious and remote from our present design.

CX. Nevertheless, we would have it to be remembered, that it has been once and again remarked, that some cows give richer milk than others, particularly in No. 77, and in No. 82, it was noticed, that cows, when in the situation we commonly term farrow, give richer milk than when in the opposite condition. And it has also been observed in No. 81, that as the period of their calving does elapse, their milk becomes gradually richer, containing a larger quantity of the more solid matter of milk, in a given quantity of it. And it has also been observed, that well-feeding hath a very considerable

influence upon both the quantity and quality of their milk. Moreover, it has also been observed in No. 67, that the latter part of each cow's milking is richer than the former.

CXI. These, then, are some of the facts respecting the state of milk, which are indisputably capable of being profitably improved to advantage, in the feeding and fleshing of calves, provided they are accustomed to lap, tho' otherwise they are not.

CXII. Therefore we are fully persuaded, that it will be evident, beyond all peradventure, on each hand, wherefore calves cannot be gotten properly fed and fleshed, in the usual fashion of feeding them ; and, at the same time, the most conspicuous evidence, that we could produce, why they ought to be taught to lap their milk ; namely, because the advantage of the particular circumstances which we have been endeavouring to point out, with regard to the qualities of milk produced by

kind under various circumstances, will not be gotten properly improved, while they continue to be fed in that manner, neither can they get more milk of any kind than their mothers do afford to them.

CXIII. We therefore now proceed to point out the most approved manner of feeding calves, in order to both speedy and well-fleshing them which we know of being yet put in practice, and confirmed by experience, with regard to the choice of milk—the mode of giving it to them by laping, has been pointed out in No. 106.

CXIV. So soon as calves intended for the market, are come to be about two, or three weeks old, they must always at each meal-time be allowed so much milk as they will take. Moreover, in order that they may be more expeditiously fleshed, when milk of different degrees of richness is on hand, they must also be allowed the very best; and this will be the more parti-

cularly necessary the nearer they come to the market. And it may certainly be reasonably presumed, without being demonstrated by experiment, that the richest milk, because containing most solid matter in it, affords most nourishment; therefore we are persuaded, the richest milk will have most influence, in quickly promoting their well-fleshing; for this cause they should be continually punctually fully fed with the richest milk that can be afforded. See No. 110.

CXV. Particularly with the milk of farrow cows, and with the milk of those that are old calved, rather than with the milk of these more recently calved.

CXVI. And it will also be necessary to feed them with the milk of cows which may be known to be particularly rich; this may be partly judged by the appearance of it, as in No. 84, and likewise with the milk of cows particularly well fed. See No. 77, and

a cow or two may be fed for sometime merely for the purpose of affording rich milk, for expediting the fleshing of sale calves.

CXVII. And since we know the latter part of every cow's milking is thicker than the first, it will be requisite, especially when they cannot otherwise be gotten properly supplied, to take the benefit of this particular circumstance; and which may be conveniently enough obtained, by first milking the one-half, or two-thirds, of several cows milk, and giving it to the younger calves, and these intended for upbringing; and then milking the remainder, which must be entirely allotted for those that are meant to be speedily well-fleshed for the market.

CXVIII. When milk comes to be scarce, which will sometimes unexpectedly happen to be the case, or when a sufficient quantity of milk of the kind wished-for is not readily to be come at, in such instances, it will be found ne-

cessary to supply these temporary wants, by mixing a due proportion of oat or rather pease meal, among the milk intended for those calves, which are fleshing. This hath been pretty frequently practised; and it will be found not only harmless, but to have very remarkable efficacy when the use of it is duly persisted in, in accomplishing the end in view.

CXIX. Some farmers maintain, that calves do fatten better when their milk is seasoned with common salt; although we know that this has frequently been practised, and it is said with good success; of this, however, we can say nothing with entire certainty; only we would have people cautiously try it at first, lest the calves dislike their milk on this account, or are not the better of it.

CXX. However, that all ambiguity may be removed, and error avoided, and agreeable to what has been advanced in Nos. 81, 117, it may be observed, that

it will be found, if strictly enquired into, that the milk of cows, when newly calved, is then uncommonly thick; and thus it continues for the space of several days, then it becomes thinner; but this milk, though remarkably rich, must not be given to calves far advanced in fattening, at least to any considerable quantity at one time, because it will be very apt to bring on a looseness, which may prove afterwards difficult to restrain; and if this does take place, it will retard their fleshing.

CXXI. The importance and propriety of having such a number of calves successively a-feeding, during the course of the winter season, as the flock of milk-cows will support sufficiently with milk for the different purposes intended with them, will appear not only indifferent, but of the utmost importance to the farmer; and the feeding them somewhat sparingly, when young, will be understood to be at least innocent, if not carried too far, and, of course, of utility, as affording

an opportunity of feeding other ones more fully.

CXXII. With regard to situation, it will be requisite to keep calves confined to a pretty dark place, lest they should fatigue themselves, by sporting in the light, because that will be detrimental to them; and they should be allowed to lye dry and clean.

CXXIII. Frequent bleeding animals has long been reputed to have the effect of making them become fatter-fleshed, than they otherwise would do. This ought also to be attended to, in the fleshing of calves; therefore they should, when a-fleshing, if once at, or above four weeks old, be bled once every two weeks successively, in such quantity at each time, as their age and size shall admit of, without hazard. Bleeding ought rather to be frequently repeated, than much taken at one time. Bleeding in this manner is not a new invention; it has frequently been practised by the farmers who feed

calves to the most considerable extent ; and they repute bleeding most particularly requisite and useful to calves, when they are grown large, and of considerable age, especially if they are affected with scabbing, or eruptions upon their skin, or if they do not appear to be fattening in proportion to their feeding.

CXXIV. Some farmers feed calves until they are three or four months old, and sometimes even more ; however, in general, it will be found more profitable to feed them only until about seven, eight, or nine weeks old, at the farthest ; perhaps, seven weeks old will be found the most proper age to sell at : and if other calves were always in readiness to be had, it would be most advantageous to dispose of them about this age, and then begin to feed others ; but if others are not in readiness, it will be better to feed one a very long time, rather than none at all. The time, however, to sell at, must rather be judged of from the pro-

gress which they have made, and the degree of fatness that they have acquired, by the time they have taken to acquire it, together with the quantity of milk on hand, &c. than from any certain number of weeks old that they may be of.

CXXV. Farther, if the Farmer's stock of calves are found not sufficient for taking all the milk, he will find it to his interest to purchase young ones, occasionally, on purpose to fatten them; and this is very frequently practised by farmers in some places of this country. These that are brought in to be fleshed, are usually termed foster calves. We would have it to be understood, that whenever farmers have more milk than is necessary for the calves which they have, they should endeavour to procure others, that all their milk may be profitably disposed of.

CXXVI. Calves intended for up-bringing, should not be fed so, as to make them become very fat. This

is not at least of any benefit, if not rather injurious to them afterwards, because, if they are once fully fed, they take worse with spare feeding than if they never had been fully fed; nevertheless, it should be remembered, that if calves are not properly brought up, it cannot be expected, that they will be of the proper size, nor soon at the state of milk-cows; both these are often no inconsiderable loss to the farmer.

CXXVII. It generally happens, by the latter end of the month of March, and sometimes sooner in the season, that veal-meat becomes plentiful in the market, and, of course, is cheaper than a little earlier in the winter, though a good calf will take the market at any time of the year: therefore those who intend to raise money by feeding calves, ought to have a sufficient number of cows to calve early in the winter, that they may have some a-feeding all the winter over, and that their calves may be got into the market by the latter end of March: in the month of April,

veal becomes still more plentiful, and, of course, cheaper.

CXXVIII. Respecting the properest time for cows to calve at, could this be got at command, we imagine a farmer who hath a dozen cows, would perhaps find it most convenient and profitable, could he have two to calve, in each month through the course of the winter half year; and while he will make most money of the earliest calves, he will make most of the late calved cows in summer, because they will milk best. See No. 20.

CXXIX. If the farmer has gotten a sufficient quantity of milk, for making butter, cheese, &c. he will be as much, if not a greater profiter, to dispose of all his sale calves, unless he has some nigh fit for the market, and wishes to defer putting them off a little, until fully fleshed; and then begin to the summer course of business, by the middle of April, or the first or twelfth of May at the farthest. In this the mild-

ness of the season, at the time, with some other concomitant circumstances, which will natively occur to the mind, ought to be attended to.

CXXX. Were farmers but once brought into acquaintance with the reasonableness of this piece of œconomy; various trifling-like circumstances will be found of importance, to these who do wish to feed and fatten their calves to the best account, which would, perhaps, appear quite despicable in the eyes of a mere spectator on the subject.

A MILK HOUSE AND CHEESE HOUSE.

CXXXI. **A** Milk-house is another thing quite necessary to the having milk conveniently manufactured in the best manner; with regard to situation, it should, if convenient, be pla-

ced upon the north side, or end of some other house upon moderately dry ground, where it will be much cooler, than exposed to the direct rays of the sun, at a sufficient distance from puddle or plash, where vegetable, or any kind of animal substance may be lying, souring, rotting, and stinking; some such place is not unfrequently to be found at farm-houses, occasioned from foul water, whey, or the like, being sent out by a gutter not capable to carry it sufficiently away; by which means a small pond of plash of the most disagreeable nauseous smell and appearance is formed, emitting sour, stinking, unwholesome vapours. If any such puddle is allowed to remain near a milk-house, the milk in it must, beyond all peradventure or disputation, be badly affected from it, and remarkably apt to become sour.

CXXXII. If the ground upon which the milk-house is placed shall be very dry, it may be placed a little way into the ground; the floor should be pave-

mented with hewn stone, or laid with flag-stones, or with well-wrought lime, or clay-mortar. It should be sufficiently well covered with thatch, rather than with slate or tile, because less dense than either of them is preferable, as being less apt to transmit heat. If the house is to be lofted, slate or tile will do well enough. The walls should be well plastered, and very smooth, in order that rats or mice may not be able to get up or down them. The floor should be kept as dry as the nature of the soil below will admit of, because, if the floor is allowed to become wet, dirty, and sour, it will be next to impossible to preserve the milk in such a house without becoming sour, &c.

CXXXIII. The doors should be kept constantly close shut, except when absolutely necessary to open them; at such times, however, as the milk is all out of it, it will be very necessary to allow the doors to stand wide open, in order to transmit fresh air freely through it,

CXXXIV. Farther, in order to supply a milk-house properly with air, if it is not lofted, it ought to have ventilators at the top, so constructed, as that the air may be freely admitted, or let out, without admitting light or rain to fall in; or, if the house is lofted, ventilation may be sufficiently well accomplished, by putting two small windows or openings in the side-wall of the apartment, opposite, or at some distance from one another, so constructed, by means of boards overlapping one another, without being in contact, or the like device, without allowing light or rain to fall in, and fitted for being occasionally opened and shut at pleasure. Without some such contrivance or means as has just now been mentioned, the air of a milk-house cannot be got changed, at desire, without admitting light, which always proves notably injurious to milk. Air, as is well known, tho' it does not in itself corrupt or vitiate, yet it soon becomes impure, from vapours, or something emitted from animal or vegetable matter, in the ordi-

nary heat of our atmosphere, if confined. And, as impure air affects milk, as well as all other substances capable of fermenting, souring, and rotting; it becomes therefore necessary to have the air in a milk-house occasionally changed, lest the natural qualities of the milk should happen to be changed previous to its being disposed of.

CXXXV. A milk-house, whether covered with thatch, tile, or slate, ought always to be well lofted with wood, at least that part of it where the milk stands immediately under ought to be covered, because, if it is not, particles of dust will always, now and then, be dropping down, particularly if covered with tile or thatch; if covered with the latter, mice or rats, by working in the roof, will be exceedingly apt to foul the milk; and, if covered with the former, the particles of lime and tile will be frequently falling from the roof.

CXXXVI. Whatever degree of cool-

ness any place is of whereinto any thing is put, the thing put into that place becomes gradually cooler and cooler, until it has become equally as cool as the place into which it is put or placed in; it is therefore evident, the cooler the milk-house is within, the milk placed in it will be so much the sooner cool, and to the same degree of coolness the milk-house is of within, but not more.

CXXXVII. A cool, well-aired milk-house, must certainly be productive of several advantages, as sooner and more completely cooling the milk; it will have the effect of preserving it longer in good condition; so that those who make full milk cheese, will scarcely ever have occasion for making whey oftener than every other day, except they shall find it more convenient for themselves.

CXXXVIII. But to those again, who make both butter and cheese of their milk, a cool milk-house will still be of

more particular advantage, because the sooner and more perfectly milk is cooled, the longer it will continue well tasted, and without becoming sour; and it is also commonly alledged, the more speedily and completely milk is cooled, it will cast up the butyraceous part in the form of cream sooner, and more completely too than otherwise would be the case.

CXXXIX. Hence, in the warm summer months, particularly, it will be of singular advantage, as the milk will be sooner cooled, and got more early lifted, while the cream will be more perfectly formed upon it.

CXL. When the milk vessels are to be kept in the milk-house until used, they should be allowed to cool completely before they are put into it, otherwise the heat of the vessels will be apt to have effect upon the milk, by too much heating the apartment.

CXLI. Some have a custom of allowing the churn, with the sour cream in it, to stand in the milk-house; but, as the milk in the other milk vessels will be very apt to be soured, from the sour vapours rising from the sour cream in the churn, the churn should therefore never be allowed to stand in the milk-house.

CXLII. Not a few farmers winnow their cheese in the milk-house; but if a milk-house is properly close and cool, as it should be, cheese will scarcely winnow properly in it; yet, if it must be so, new cheese should not be put into it until somewhat dried at least; and, if kept in it, they should be placed in the middle of the house, near the door, where it may likely be most airy and dry.

CXLIII. A cheese-house very convenient and proper may be had, by separating a part from the milk-house, by means of a brick or stone wall partition, with a door and window in it,

placed opposite to one another, if convenient; by which means access may be had into it, without opening the milk-apartment, and dry air may be admitted and regulated at pleasure, by occasionally opening the window.

CXLIV. Some erect a small house, for the above purpose, for winnowing their cheeses in, and for setting their churns with sour cream into, and for placing their milk vessels in which are not employed, and the like.

CXLV. Others, again, find a convenient and good enough place for the same purposes within the roof of their milk-house, by well lofting it, and putting in a window. It should be remembered, that if the roof is not pretty close in the thatch, or if much exposed to the winds, it will prove too dry.

CXLVI. Not a few considerable farmers have no other milk nor cheese house than their barn. As these are

generally unlofted, dust may very readily drop from the roof into any open vessel; on which account they are exceptionable.

CXLVII. In whatever place cheese is kept, except upon a loft, to save room, and afford more ready access to turn and clean them, and as more commodious for placing them to the drought, as circumstances require. Planks, sufficiently broad to lay them upon, should be fitted up in nearly the same manner as the shelves are in merchants shops.

OF THE SUNDRY VESSELS USED
IN MAKING CHEESE.

CXLVIII. **S**UNDRY vessels are necessary for this purpose. The fittest wood for making them of is good American oak; but since that wood is become too high in price, they are

in some places generally made of clean fir wood ; and of it they do very well ; while they have the advantage of being lighter, so they are much more easily handled.

CXLIX. A small vessel to collect the milk in, as it is taken from the cows, is necessary. This kind of vessel or tub is generally made about nine inches wide, and as many deep, water firm, and neatly made.

CL. Pails also are necessary, and are commonly in use. The milk is poured from the vessels into which it is milked into the pail, and then it is to be carried in it from the cow-house to the milk-house, in order to be poured into the proper vessels for cooling it in. These pails are generally twice as wide at the bottom as at the mouth, and are of various sizes: they generally have lugs or handles above the lips.

CLI. A proper set of milk-tubs or

vessels, for receiving, cooling, and preserving the milk in, are absolutely necessary. These tubs or boynes are commonly about one foot and seven inches wide from brim to brim, and about five inches and a half deep within. A farmer should have one for every cow, when he makes full milk cheese; and when he makes butter and cheese, it will be necessary to have three milk-tubs for every two cows.

CLII. One large tub, at least, is absolutely requisite. The size of vessels of this kind, are commonly about two feet three inches wide, and eighteen inches deep. The size of this vessel, however, should be such as may contain all the milk to be thickened at a time. It will be proper also, that one little tub of this kind be on hand to supply, in place of the larger one, in the beginning of summer, and latter part of the year, when there is but little milk. Vessels for this use, are found more convenient, when made

with lugs or two handles, to lift them by, when full.

CLIII. Several cheese-fats will sometimes be requisite. The larger sort may be fifteen inches wide, and six and a half deep, equally wide at top and bottom. Their use is to put the curd or curd into, duly cleared of whey, and salted, in order to be further cleared of the superfluous serum or whey, by pressure, and to be shaped and squeezed together. Their size must be suited to the size of the cheese to be made in them. They should be of various sizes, made stout and firm, and surrounded with iron hoops, having two rows of properly sized holes pierced round the cheese-fat; and a sufficient number of such holes should be interspersed all over the bottom, to the number of twenty at least, on purpose to afford a proper out-let for the whey, when a-pressing. Every cheese-fat must have a sinker adapted to it. The use of which is, to press, or lye upon the cheese when a-pressing. The

sinker should be shaped or sized, so as to go down within the cheese-fat, but not more, otherwise the cheese will spring up, when in the press, between the cheese-fat and the sinker, and will consequently disfigure and lose part of the cheese. The sinker should be two or three inches thick, or have bars of a proper figure upon its upper side.

CLIV. A skimming-cap, or vessel with a handle at it, is also useful, to take off the cream from the milk, to mix the milk with when thickening is put into it, and to stir the curd with, when just thickened. It is also useful to take off the float from the whey, &c.

CLV. Cheese-presses. Of these there are various kinds. Some of which are very well fitted for the purpose, others are not. Most people in the country have seen them. A description of the most part of them could not be understood by those who have not seen them, without plates. One of

the best is that where the force is applied by means of wedges. Another of the most common sort, consists of a large stone, squared by art, and fitted up in a frame of wood for the purpose. It is raised by means of a screw-nail, the one end of which is fixed into the stone, the nut of which must be previously fitted and fixed into a proper piece of wood: by turning the nut by means of the wooden handle, the stone may be raised, and let down at pleasure with ease. Another kind is worked by a wheel and rope. There is another common, though not so ingenious kind of cheese-press, consisting of a long piece of wood, and some other simple apparatus. The method of applying pressure by means of the long piece of wood, is, by fixing the one end into a growing tree, a house-wall, or the like, while the other end is free. A plain or smooth stone or board is placed about a foot or two from the fixed end, immediately under the pole of wood, then the cheese-fat, with the cheese in it, is placed upon the smooth

stone or wood ; the tree is now laid over the top of the cheese-fat, and some stones, into which rings are fixed, are hung by the rings upon the farther end of the pole, by which means a greater or less degree of pressure may at pleasure be applied,

CLVI. A scarce or fine hair-sieve is another utensil, without which, neither butter nor cheese can be cleanly made. It is used, by causing all the milk to pass through it, for separating any foreign body from it. These instruments are generally too thin in the cloth for answering their purpose or use.

CLVII. Cheese-cloths are also proper. They are made of stout tow or lint, coarse-spun, and woven thin on purpose, measuring about one yard square. If thin, they transmit the whey through them from the cheese more readily. Cheese-cloths are to be used, by spreading them, one at a time, over the cheese-fat, when the curd or gurth

is to be put into it, so as that the girth may be included in the cheese-cloth: when in the cheese-fat, the cloth is to be neatly folded over the top of the included cheese. By means of this cloth, the cheese is much more readily got out of the cheese-fat than otherwise it would be.

CLVIII. A large caldron or pot, for the purpose of heating the milk in, and for heating water, in order to scald the milk vessels, is another vessel entirely requisite for making cheese. A pot of cast iron is much preferable to one of copper, because not so apt to injure milk. If milk should happen to be sour, it is highly dangerous to heat it in a copper caldron, as the acid milk is apt to form verdegrease from the copper caldron, which is known to be very poisonous; and it is very apt to singe the milk.

CLIX. To those, again, who churn all or part of their milk, a churn or two, with churn-staffs and heads, and

a tub to wash the butter in, are all the requisite utensils.

CLX. Milk vessels of lead, have been, and still are, in great request, particularly in the dairies of gentlemen and richer sort of people, though they are not preferable upon any account, except it be for their property of cooling milk a little sooner than wooden vessels would do, owing to the density of the substance they are made of; but they have not any other superior property, though they are liable to sundry exceptions.

CLXI. The making of butter and cheese has been in use for so many ages, and universally practised over all Britain, that one would be ready, from that circumstance alone, to suppose that the practice should, long before this period of time, have arrived at the highest degree of perfection of which it was capable of ever being brought to; by continued practice, repeated experience of united numbers

in every successive generation, in every point of view.

CLXII. And, at first sight, one would be ready to be surprised, to think that the art of manufacturing milk into the several articles of diet, in common use, or the properest manner of keeping milk-cows, should still remain within the reach of farther advancement, and continue to be yet capable of any improvement, in any respect whatever; and, if we shall but enter into a butter market, or look into a cheese one, our surprise will not, by any means, be lessened; nay, perhaps, even highly excited, on inspecting, in the most slight and inattentive manner, the state in which some considerable quantity of these articles are there to be found in, as there exposed to open sale, and to open view, in day-light, in a country where the art of preparing them never was intentionally kept a secret, nor was at all confined to a few self-interested cunning individuals, far less entirely confined to philosophers

of the first or second magnitude in academical or professional knowledge, neither at home, nor in some foreign nation, to be got at by neither sea nor land; nor the path of practice, the most accomplished of all masters, lying unoccupied for many centuries, or the way to improvement, shut up, sealed, and set by; but every pleasant avenue, exciting every reasonable hope, and promising every rational reward, lying wide open, unoccupied, at noon-day, unnoticed, or ever looked at, entered into, sought after, or expected to be found, by not a few of the many, who are ordinarily more particularly concerned in the immediate prosecution of the practical part of this very ancient as well as modern piece of husbandry.

CLXIII. The most material defects, more usually met with in these, are occasioned from some defect or another in the manner of preparing the several articles usually produced from milk; or from some bad management

of the milk itself before it comes to be manufactured into any particular article or articles. All these will, we are persuaded, be found to proceed from some one or another ; or all of the few following causes, to wit, ignorance, inattention, carelessness, and want of due cleanliness.

CLXIV. To ignorance respecting the proper manner HOW, and the time WHEN, milk ought to be disposed of under the numerous different circumstances, which the situation of the place, —the season of the year, —the nature of the soil the farm is of, —the state of the milk with respect to the proportion and quantity of the several more valuable parts which it does contain, and the quantity of the less valuable in regard to the former, shall require. And the neglect of calf-feeding, from which practice so much money is obtained in some places of the country, and yet so generally totally overlooked in others. As to all these, ignorance is certainly the chief cause ; yet,

as a little information and consideration are, we presume, all which are necessary to finally dispelling these mists; therefore they may be expected soon to be got removed, if once people were got fully awakened and stirred up to make proper enquiry after the propriety and proper manner of doing these things, upon rational principles, as occasion may require.

CLXV. The second cause of imperfection enumerated, was inattention and carelessness. This business has been so long carried on, and always in nearly the same manner, without at least any notable alteration in the fashion of doing it, in almost every place, that we are persuaded, people will scarcely be got generally convinced, that it is practicable there could be any variation made, and much less convinced of any profitable change; every one imagining they can do this business as well, if not much better than any one of their neighbours; therefore they are at rest, entirely well satisfied, that the custom,

so universal, and well established by long continued use, is, and must, of course, be the best, and only mode, which could possibly be put in practice; and that there neither is occasion for, nor could there be any better manner invented, nor fallen upon, neither any farther improvement introduced upon the common practice.

CLXVI. Though to the causes but just mentioned, we must impute a very considerable number of defects in the articles, the produce of milk, but too frequently met with: we must not suppose these defects are to be found, either in every individual cheese, nor piece of butter; nor in every other one, neither to the same extent which they have formerly been, nor that the art of making them is in every place equally defective, though in some few instances they are to be found in their utmost extent.

CLXVII. We may, in justice to, and in favour of the present age, ob-

serve, that though in many places that degree of attention has not hitherto been bestowed upon this subject, which to us it appears well deserving of; yet, according to the information we have of the practice, and state of the articles we speak of in former times, we are disposed to believe, that, of late years, farmers, in general, have paid much more attention to the well managing of milk-cows, and the preparation of cheese and butter, than was wont to be the case in earlier periods.

CLXVIII. Though we are convinced, that in most of the shires in North Britain, very much in both these respects still remains to be done; we take it for granted, without producing any direct proof of it, that at present, in many places, the quantity of butter and cheese, now annually produced, will at least be found one-third part more than that produced but sixty years ago was, and perhaps at a still latter period, and see good reason for supposing the quantity may yet be

much larger, and the quality less exceptionable.

CLXIX. It must be allowed, however, that the nature of the milk of some individual animals, and the milk of some particular farms, hath been observed to have considerable influence upon the colour, and consistence of butter, and that some soils will produce butter different in taste, inclining to bitter, particularly unlaboured grounds in the beginning of the summer, and the fatness of cheese. It must also be granted, that, in a few instances, both butter and cheese may misgive in the preparing, even under the most acute eye, and dexterous hand, in œconomy; however, if due attention is given, and the business carefully conducted, these will be but very few.

CLXX. Want of cleanliness is the third cause of imperfection, which was enumerated; and is, perhaps, the most important to society of any of these; and, consequently, this grievance is, of

all others, of the greatest importance, and requires speedy redress, because this defect is the most nauseous, and the articles are not unfrequently purchased and broken into, before this accident can be sufficiently ascertained. But the causes are so many from which milk, and the several articles prepared from it, may be fouled, that we do not even propose to enumerate them, which would be a task both tedious and irksome even to relate; we only do observe, in order to have butter and cheese cleanly prepared, much caution and attention, no doubt, is requisite; yet a little more pains will be found to make all the difference, and, in fact, is all that is necessary for obtaining this notable and honourable end: in general, we would have people more careful to study cleanliness, in every respect, in the management of milk and its produce.

CLXXI. From inattention and carelessness in the prosecution of this business, in the following respects, the re-

spective bad effects will ordinarily be found to follow of course: As,

From putting milk into tubs not sufficiently seasoned, is produced bad tasted milk and cheese.

From allowing milk to stand too long before it is lifted, beside the above bad effects, it will be apt to become sour, thence sour cheese.

From immoderately heating milk, the effect is hard, dry, tough cheese, &c.

From allowing it too little heat, is produced soft cheese, continuing so for a long time, difficult to press sufficiently, and as difficult to prevent from falling out into roting spots, dropping whey for months perhaps.

From not sufficiently clearing the girth of whey before salting, proceeds insufficient saltiness, from the remaining whey carrying out too much of the salt.

From insufficient salting, is produced hoving or swollen cheese, of different colours, abounding in vermin, and of a disagreeable smell and taste, as well as rotten.

From immoderate salting, the cheese is difficult to be got cleared of the whey by pressing, and often remains long soft, without particular care, and continues always too salt.

From omitting to mix the old and new gurth together, and from neglecting thoroughly to mix the salt among either, or both, when put into the cheese-fat, is produced cheese unequal in colour and consistence, cracked in the surface, not sufficiently cohering together, &c.

From insufficient pressing, it slightly coheres together, remains too moist, difficult to winnow, often falls asunder.

From immoderate winnowing, cheese becomes too dry and hard, and rather insipid.

From neglect in turning, cheese are often found partly rotten, part hard, part soft, unsound in the surface, and bitter tasted at such places.

CLXXII. And in preparing butter,

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various bad effects also succeed, as the consequence thereof: As,

From making use of a churn insufficiently seasoned.

From allowing the churn and milk to stand in a damp badly aired apartment.

And also from allowing the milk to stand too long.

And likewise suffering the inner side of the churn, and surface of the milk in it, to become mouldy; from all, or any one of the above causes, or any other inattention, whereby the milk may be injured, butter of a whitish colour, inclining to green, and of a disagreeable taste and smell, is produced.

From incautious churning, and from giving it too much heat by any means, it will be too soft, and also often too white.

From insufficient washing, we find butter-milk in the butter, or around it, or both.

From neglecting to discharge the water, we find too much brine-like matter around it.

From insufficient salting, we have it rotten, and of a disagreeable smell and taste, &c.

CLXXIII. We are aware, most of these defects, but just enumerated, will, of course, come to be repeated; yet we have considered it necessary to give them a place here.

OF MAKING FULL MILK CHEESE.

CLXXIV. **I** Shall suppose a farmer intends to begin making cheese on a Monday morning, when he will have, of course, three milkings or meals of milk on hand. The one milked on Saturday evening should be properly set aside in the milk-house, in such a number of tubs as the quantity of the milk shall fill up to a due depth; and another milking of Sabbath forenoon previously set aside, as before-mentioned; and another milking of

Sabbath evening, which should be poured into the large tub, or whey-boyn as sometimes termed, already described.

CLXXV. The first thing, then, to be done, is to skim the cream off all the three milkings in the milk-tubs, and to set it aside, and lift the milk, and pour it into a pot, in order to be heated: the pot being put upon the fire, the milk in it should be kept constantly in motion, by stirring it briskly, lest part of it become too hot, while another part remains unheated, or lest it singe upon the bottom of the pot, which milk is very apt to do when on the fire, particularly if in a copper pot or kettle. If the milk is heated in a copper vessel, it ought to be stirred with a wooden rod only; but, if in an iron pot, the wooden rod may be shod with iron.

CLXXVI. The next thing is, to determine when the milk is sufficiently heated. This is of considerable impor-

tance, because, if the milk is too much heated, the cheese will be tough and hard in the skin, almost like horn, while within, the cheese will remain of a duller colour than natural, owing to the density of the cheese, from a close joining of the particles; and if not sufficiently heated, the whey does not run sufficiently off, and the cheese will be apt to remain a long time soft, and to weep out whey through the skin at various places, even a long time after, which appears very unsightly; nor is such cheese so delicious food. The most certain method of measuring the heat of milk, like other things, is found to be by applying the thermometer. In cold seasons, and even in the fore end and latter part of summer, when the atmosphere is pretty cold, it will be found requisite to give the milk a little more heat than is necessary in the heat of summer, without injuring the cheese in the least.

CLXXVII. As for fuel to heat milk with, peats or wood, if to be had, are

preferable to pit coals, because the black smoke rising from burning pit coals is very apt to give the milk a bluish tinge, which also affects the cheese of such blackish tinged milk, and is very unsightly and dirty. The danger may be somewhat abated, when pit coal is used, to allow the coals to be somewhat charred, and mostly reddened, before the milk-pot is put upon the fire.

CLXXVIII. Ascertaining the heat of milk, by dipping the hand, or a finger or two into it, must always be indeterminate with regard to the precise degree of heat, particularly when the person is not accustomed to make trials of this kind; hence, we frequently find women say, 'Such and such a cheese has been too cool when thickened, and such another has been too hot at that time.' But the degree of heat that milk should have acquired, when fit to be thickened, in the various seasons of the year, must be a little different, and can only be suffi-

ently ascertained from experimental facts.

CLXXIX. Though every farmer may not have a thermometer to measure the degrees of heat milk has got; this does not hinder but that farmers should be at all due pains to ascertain, from experience, what degree of heat is most advantageous to thicken milk at, in the various temperatures of the season; and endeavour, then, neither to over nor under heat, but study to have it constantly at a good medium.

CLXXX. The common manner of ascertaining the heat of milk, by dipping a finger or two into it, is apt to be very vague and uncertain, not only from the milk being unequally heated, which, if it is, it will deceive, tho' the thermometer was used. To ascertain the real heat, particularly, when the person who makes the experiment is not accustomed to make trials in this manner, must appear very uncertain to every one. And if the finger, used

in making this experiment, shall happen, when dipped into the warm milk, to be colder than natural, the person will very readily be deceived, because the heat of the milk will, upon the cold finger, feel sensibly hotter than it in fact is.

CLXXXI. Again, if the fingers shall be preternaturally warmed, newly taken out of warm water, or the like, and be immediately put into the milk a-heating, the milk will not give that sensible impression of heat that it naturally would. Thus persons are liable to be mistaken from the degree of heat the fingers are of, at the time of making the experiment. We imagine, that the unequal temperature of the hand, at the moment trials of this kind are made, is more universally the cause of mistakes with regard to the real heat of milk than any other; and, consequently, the occasion of so many cheeses being badly made.

CLXXXII. But persons are not on-

ly liable to commit errors from these causes, but also from the milk being unequally heated, as already observed. Therefore, to have the heat of milk determined with proper accuracy, it will be requisite to make a true trial of the heat in such cases, that the milk on which any kind of trial is to be made, should be equally heated, and the fingers, if they are made use of, should be of the natural, or about the common temperature. In addition to what has been already said, it may still be observed, that the heat of the hand is liable, from so many different causes from without or within, to be of unequal warmth, that trials made with it are likely to be vastly precarious and irregular, as to the genuine or true heat any body is possessed of. It must be allowed, however, that it is not a little surprising, with what accuracy some persons, from experience, can determine when milk has become sufficiently warm for being thickened.

CLXXXIII. To those who have it

not in their power to obtain a thermometer for ascertaining the true heat of milk by, we would recommend to them to study to be able to judge as accurately as possible when milk has acquired a due degree of heat, and to cause it to be stirred well, when trials are to be made, and that the fingers or hand with which the experiment is made, be neither sensibly cold nor warm, when the trials are made.

CLXXXIV. As was already said, the genuine heat of milk cannot be ascertained so exactly as could be wished by any other means than by the thermometer: and as one fit for this purpose may be had, at the very low price of three or four shillings, or lower, the generality of farmers might have one; if their usefulness was known, we imagine, they would be in general use. They may be found in Edinburgh and Glasgow, and perhaps in many other places in the country.

CLXXXV. The heat of milk may

be ascertained by the thermometer with the greatest possible exactness; and may be done in this manner:

CLXXXVI. Let a small thermometer, mounted upon an ivory plate, properly graduated, or marked with the several degrees of heat, at least from 32 to 212, be placed or suspended in the heating milk, all the time the milk is a-heating upon the fire. When the milk becomes somewhat heated, the thermometer ought to be partially lifted out of the milk, and observed whether the mercury is not risen to one hundred; if not, it ought to be let down instantly, and then in a little lifted, and observed again: and thus it ought to be repeatedly observed, at short intervals, until the mercury stands at 100, when it should be instantly removed from the fire, and poured into the whey tub, through a searce, and then treated as is soon to be observed. We suppose, from some circumstances, that about 100 degrees of heat will be found the most generally proper to

thicken at: but, in very hot seasons, however, 90 degrees will be found, perhaps, sufficiently warm, or it may be some few degrees lower. Again, in cooler times of the year, and, as formerly noticed, it may be requisite to heat the milk to 110 degrees, or it may be, to some few degrees higher; for we do not know how many degrees of heat may sometimes be necessary; but a little experience, with such an accurate instrument as the thermometer is, will enable persons to determine what degree of heat is necessary in every case.

CLXXXVII. We imagine it might be very convenient to suspend the thermometer in the milk by means of a linen thread fixed to a plug of wood, by which device it might always be readily got hold of, in order to be observed, and would swim in the midst of it.

CLXXXVIII. It is but seldom, however, that the whole of the milk to be

thickened at one time is all heated upon the fire; and it is the most general custom, to put the one-half or two-thirds of the milk upon the fire, and to heat this one-half or two-thirds so much, as that it may, by being mixed with the other half or one-third of the milk not heated upon the fire, communicate heat enough to it. Though this practice may do pretty well, yet we are disposed to believe, it would do better to heat all the milk together, or at least so much as can conveniently be got heated. And it may be observed, that if the one-half only is heated, it must be heated sufficiently warm to give enough of heat to the other part of the milk to be mixed with it. What degree will be necessary in such cases, depends on the quantity of the cold milk it is intended to heat, and the degree it should be heated to; hence, the heat milk should have acquired, in such cases, cannot be ascertained but from experience. Some advise to heat it so long as the heat

can be borne easily with the hand; this also is uncertain.

CLXXXIX. If milk shall happen, through inattention, carelessness, or otherwise, to be too much heated, it will somewhat lessen the injury, to allow the milk to cool till it be reduced to the proper heat of 100 degrees, or so, as before-mentioned, before the rennet be put into it.

CXC. If it should be found to be not hurtful to give milk any degree of heat, and then allow it to cool till it be brought back to the proper thickening heat, it would be best to place the thermometer for ten or twelve minutes among the milk, after being all mixed together; but this will not at all do.

CXCI. The milk, being now properly heated, should all be passed through a proper hair searce or sieve, into the large tub prepared for its reception. When the heated milk is mostly added

to the cold milk in the large tub, the cream, which was formerly taken off, and set aside, must now be passed through the searce also, and then the remainder of the heated milk passed after, in order to clean the searce of the cream; if the milk is all heated of a moderate warmth only, the cream may be put in any time, but should not be ventured upon the fire in any case; for, if put in when very warm, it will be apt to be melted, or the butyraceous particles will be injured from the action of the heat. The milk being all put into the tub in which it is to be thickened, and of a moderate heat, put the rennet into it, and then let it be immediately and thoroughly mixed, by stirring it with the whey-laddle or cup. After this, the milk should be covered with a clean cloth, and allowed to stand quiet till it is thickened, which will readily happen in about fifteen or twenty minutes, or an hour, when the cloth may be removed. Then the thickened milk or curds must be repeatedly stirred in the tub by means of

the whey-cup. The curds, however, ought to be stirred very cautiously, otherwise they will be too much broken down, which will occasion many butyraceous particles to be separated and go off among the whey.

CXCII. Those who have considerable experience in this business, recommend it as a much preferable manner of conducting the separation of the whey, after the curds have been twice or thrice gently stirred, to press the curds with the hands only; and it ought to be done very gently at first, though afterwards the pressure may be increased. The curds being thus pressed down together, the whey comes out, and stands above, which will happen, either from stirring with the ladle, or from pressure. The whey must be lifted off with the whey-ladle.

CXCIII. The using pressure has two advantages; the curds keep longer warm; and there is not the least dan-

ger of butyraceous particles being separated.

CXCIV. When the greater part of the whey is separated and taken off, the curds become pretty firm: it will then be highly injurious and improper to break the curds, by working or turning them through other, as was above recommended as proper or innocent, on being newly thickened; but, as the curds become firmer and tougher, it will be requisite, in order to cause the whey separate more freely, to cut the curds, when arrived at this thickened state, with a table-knife, or the like, or with a particular instrument made for the purpose, (which may be termed curd-cutter,) with as many parallel strokes as may be judged proper: at first, three strokes across each other will be sufficient. The curd, after this, should instantly be turned up together, in order that the whey may separate more freely.

CXCV. Thus the curd, when be-

come pretty firm, may be repeatedly cross-cutted, overturned, and well pressed with the hands, or by laying some gentle weight upon them, such as a stone of twenty, or twenty-four pounds weight. When weights are to be applied, it will be proper to put the curd into a cheese-fat, just after being cut into eight or ten pieces, in order to cause the whey separate more expeditiously. After standing about seven minutes in the cheese-fat, take out the curd, and cast it into the large tub, cut it, and fill it up into the cheese-fat, as before directed; and put more weight upon it, perhaps double. Let this be repeated two or three times in the same manner, or oftener, as may be found needful.

[CXCVI. The whey being in this manner pretty completely separated, the curd will have acquired a pretty firm consistence. It must now be put into the large tub, and reduced into small pieces, about the size of beans, by cutting it with a table-knife, or with the

instrument for the purpose. The curd reduced to this state, is termed *gurth*, which being thus reduced to sufficient small pieces, must be salted, on which much depends. If too much salt is put in, the whey does not separate so readily, and, of course, it is more difficult to get it properly pressed, or stoned, (as it is often termed.) And if the *gurth* gets too little salt, it will not be possible to preserve it, but it will have a disagreeable smell and taste, and be apt to breed vermin. The quantity of salt that should be put into *gurth*, so as to cure it properly, and give it a good taste and savour, and not more than precisely necessary, is somewhat difficult to ascertain, from causes soon to be mentioned. However, in general, we imagine, it will be found, that about one pound English of salt, to one stone tron of cheese, when dried a little, will be a sufficient quantity for preserving the cheese for use, and give it a proper taste, with respect to saltiness.

CXCVII. It must be observed, how-

ever, that if the gurth is not duly cleared of the whey, when the salt is put among it, when the gurth comes to be cleared of the remaining whey, a larger portion of the salt will come to be carried off along with the superfluous whey than would have been the case, if the whey had been more entirely separated at the time of adding the salt; consequently, when the gurth happens to be indifferently cleared of the whey when salted, more salt ought to be put into the gurth than will be requisite, when it is more completely cleared of the whey. As the quantity of the whey remaining in the gurth is, so should the quantity of salt be, in proportion. The result is obvious, viz. that as the remaining quantity of whey is uncertain, so the quantity of salt that should be added to the gurth, remains uncertain also. But as persons, daily practising this business, will be able, with very little attention, to determine when the gurth has come to a due consistence; and, if due attention is paid to the degree of dryness of the gurth,

and if it is always brought to the same dryness, as it should be, before the salt be added to it, there will be no difficulty in ascertaining, with exactness, the quantity of salt in proportion to the quantity of the cheese: And thus the quantity of salt may always be adjusted, with precision and accuracy in every case.

CXCVIII. People, in general, in this country, have no other way of ascertaining the quantity of salt to be put among gurth, but by tasting it, and forming a judgment from thence. But the taste of the persons who make this trial may be unfit for making such experiment, as, suppose it is vitiated from having eaten something very salt, or quite fresh, immediately before; in either case, the taste will be prejudiced, and utterly unfit to judge properly of the degrees of saltiness any thing is possessed of.

CXCIX. The gurth having been reduced to a due smallness, properly

salted, and thoroughly mixed with the hands, and properly prepared for the purpose, it should then be filled into the cheese-fat, overspread with a cheese-cloth, and being well packed into it, the corners of the cheese-cloth are to be turned over the top of the gurth, which will readily be a little higher than the lips of the cheese-fat, and then it must immediately be put into the press, with the sinker above the cheese-fat, to squeeze out the superfluous whey, and to give the cheese a due shape, and reduce it into a due consistence. If convenient, some vessel should be placed, so as to collect the whey that runs off from the cheese-press: this whey should be set aside, and put into the next day's when coming to boil: the salt causes the float-whey to separate more completely.

CC. The cheese, on being first put into the press, should have but a moderate weight applied, that the pressure at first may not be too much: then, in about fifteen or twenty mi-

minutes, more weight should be put on; or, in other words, the pressure should be increased to the extent found requisite to press it sufficiently: then, in about eight or ten hours, the cheese should be taken out, and a dry cloth being spread upon the cheese-fat, the cheese should be put into it with the upper side undermost; and thus the cheese must be taken out and turned thrice a-day, or oftener, until sufficiently pressed, which is, when the cheese ceases to wet the cloths. When it comes to the last time of putting them into the cheese-fat, it is common to put them in without a cloth, in order to give the cheese a smooth skin, that they may not afterwards appear cloth-marked. Lastly, Being sufficiently pressed, the cheese is to be put into a proper place to be dried.

CCI. Many who have but small herds of cows, have it not in their power to collect so large a quantity of milk at a time as would be a cheese of an ordinary size, without keeping part of

it till it be too old. Therefore they make a cheefe every other time only that they make whey, which is every day, or every other day only. The first time they make whey, they manage, or should manage, as just directed. And having conducted the business until the gurth be prepared, they salt it, and put it into a cheefe-fat, or some similar vessel, with a number of perforations in the bottom, and place it in the milk-house with a proper vessel under it, to collect any whey that may come from it: then, the next time they make, when they have got the new curd brought the length of gurth, they mix them together, and add salt sufficient for the new gurth, and make both into one cheefe, having thoroughly mixed them together, after having cut the old gurth as well as the new, as directed in No. 196.

CCII. Though people who make full milk cheefe do generally make whey about noon, every day, Sabbaths excepted, because one meal is warm,

being newly milked, and one or two only are necessary to be warmed; yet they may make every other day only, or at any time they find most convenient; only observe, it ought to be done before the milk become sour or bad tasted, which, if it happens to do, proves very injurious to the cheese made from such milk.

CCIII. From changes which take place in the state of the atmosphere, with regard to heat and cold, and the weakness of the bait made use of, or given in a too sparing quantity, and, perhaps, some causes not always readily to be foreseen, nor prevented; it will now and then happen, that milk shall be longer time in thickening than ordinary, and in some few instances it will not coagulate at all on the first trial; the milk having, by length of time, become too cool before it was effected, such cases must be a little troublesome, there is not the least doubt, particularly, to those less experienced in the business.

CCIV. When milk stands longer before the curdling does take place than ordinary, it will be found difficult, though the curdling does at last take place, to get the whey sufficiently well separated from the other parts of the milk; as, in such cases, it will separate more slowly, and even less perfectly than usual, without uncommon diligence and dexterity.

CCV. In such cases, therefore, it will often be necessary to heat a quantity of clean fresh water, to the same degree of heat the milk was of, when the bait was put into it; which, when thus heated, must be poured upon the curds, and cautiously mixed with them, in order to bring them to a degree of heat sufficient to promote the separation of the whey. If the quantity of water first employed has not sufficient effect in producing the end wished for; a second quantity of water must be heated, and employed in the same manner.

CCVI. Again, when the milk does not coagulate, after having been allowed to stand until it has become so cool, that the milk is not expected to thicken at all, it must be poured into a pot, and heated a-new, as at first; if it does not happen to thicken with the heating, which will not unfrequently be found to happen, more bait must then be put into it, when set quiet, yet not more than is judged sufficient to have the due effect.

CCVII. To preserve the whey from souring, and in order to raise float-whey, it is usual to cast the whey, as it is taken off the curds, into a pot placed upon the fire, and brought to a boil-heat, at which time float-whey collects to the surface of the whey, and swims upon it; but, if not taken off before the whey boils freely, it will all disperse, from the agitation occasioned by the boiling.

CCVIII. Some few farmers have got the knack of making half-full milk

cheese, as they are pleased to term it: by which term they mean, and would have it to be understood, that the one half of the milk from which it was made was skimmed, but the other half was not. People, no doubt, may do this very faithfully and accurately; yet, according to some information which we have got, respecting this mode of doing with milk, we are disposed to believe, that in some instances at least, though, we hope, they are but few, two-thirds, or three-fourths of the milk were skimmed, and even then it is termed and sold for half-full milk cheese. When milk is disposed of in this manner, there is evidently room enough for deception: Therefore merchants, and other purchasers of cheese, under this designation, ought to be upon their guard, lest they be deceived by this denomination.

OF WASHING AND SCALDING
MILK VESSELS.

CCIX. **W**HENEVER milk-tubs are emptied of milk, they should be sufficiently washed, by rubbing them all over within, in pure, cold water, with a coorse cloth or towel; and, then, as soon as scalding water can be got ready, they should each of them be poured full of hot water, and then dried for after-use. If well washen and scalded, it will tend to preserve them sweet, and from giving any bad quality to the milk. Some are in use to scald them with whey, after taking the float off it; this may do very well, provided the whey be entirely sweet, but not all, if soured, or in a suspicious state. Thus cheese-fats, whey, and skimming-cup, cheese-cloths, whey-

tub, milking-tubs, and every vessel used, should be washen in pure, cold water, and then scalded every time they are used.

CCX. If cleanliness is not attended to in the utmost extent, all other means, though perfectly observed, will be insufficient, and utterly ineffectual in this business.

OF MAKING BUTTER FROM FLOAT-WHEY.

CCXI. **I**T was already observed, that the thick, white, soft substance, thrown up to the surface of whey, when brought to a boil-heat, is termed FLOAT-WHEY. In order to obtain butter from it, when collected from the surface of the boiling whey, it should be put into a shallow vessel till cooled, then it should be beat or squeezed, till it become soft and smooth, like

cream; then put it into the churn, and when a sufficient quantity is collected, cooled, and beat, as just directed, it should be churned, as cream or milk is: only, during the time it is a-churning, it will be necessary to pour into the churn, amongst the float, a little warm whey, at times, until a little warmed, which promotes the separation of the butyraceous particles from the whey and other parts. Whenever a little butter is observed to be collected, it should be taken off, and the churning continued till more butter is collected; when that also should be taken off: thus, it is observed, that this butter of float-whey may be taken off at sundry times. When it is taken off, it should be put into cold water, and carefully washen as other butter. The butter, thus obtained, proves as delicious as other butter; but, it is said, that it will not keep very long, even by means of salt. This, I imagine, may be very just, and solely owing to the float-whey having become mouldy in the churn, from being too long kept

before it was churned ; this is a circumstance that may be prevented, by employing a small churn in this and many other similar instances, as it will be much sooner filled. Butter cannot be obtained from the float-whey of skimmed milk-whey, being deprived of its butyraceous part by skimming.

OF DRYING CHEESES.

CCXII. **O**N taking a cheese out of the cheese-fat, it should be placed in a pretty dry, airy situation, for the space of ten days, or so: then, lest it become too hard and dry in the surface, before being dried within, from a too quick heat, the cheese ought to be put into a more close place, so as it may dry more gradually and slowly. Cheeses, when new, should be turned every day, Sabbaths excepted. It will be found proper to dry cheeses but slowly and moderately,

because, if quickly dried, they will be hard on the out-side, and softer than they should be within; and, if more dried and harder than they should be, they are neither so heavy, nor so delicious and pleasant in eating, as when moderately dried. And, which is a loss to the eater, every one knows, that very hard cheese becomes almost insipid in comparison of those which are allowed a less degree of drought.

CCXIII. This, in particular, applies to skimmed milk cheese: for the same reason, cheeses of a small size are seldom equal in pleasantness, in eating, to large ones, owing to their being more dried and insipid.

CCXIV. Full milk cheeses can scarcely be too dry; at least, the richness of them, renders their being hard dried less perceptible: they are, however, indisputably, not the better, but the worse for hard drying.

CCXV. Some allow their cheese to

become very dirty. This is extremely injurious, because the skin of the cheese is not only apt to rot, but if they are for a long time allowed to lye dirty, and the skinny parts of it become somewhat rotten: such cheese will be found to have acquired a peculiar taste, at least near the surface; and this is generally occasioned from their being allowed to lye in too moist a place, unturned. This is often a worse error than too hard drying, tho' not so common. Some wash cheeses in cold water, some in hot; and some recommend scraping them clean with a knife, or the like. Washing or scraping makes them look well; but cheese cleaned either way, are apt to turn too dry. Therefore, we imagine, it will be found a much preferable method, only to brush or rub them briskly with a cloth, which will clear off all dirt, and any foulness, if timeously applied. To prevent old cheese from being wasted or destroyed by mites or vermin, they should first be washed and cleaned as much as may be of mites and dirt; and then they

should be all over greased with salt butter; and it ought to be carefully rubbed into all the hollow places, as well as over the whole surface.

OF PREPARING THICKENING.

CCXVI. **T**HE stomach or maw of a calf is the substance from which cheese rennet or thickening* is made, though any acid will do the same thing.

CCXVII. Persons who intend to use their calves maws or stomachs this way, wish them to be duly fed on milk, and to have got a quantity of milk, just two or three hours before being slaughtered. As soon as the stomach is taken out of the animal, they make water to pass through it, by which they judge it sufficiently cleaned for their purpose. If the calf has

* Called by some, Bait.

got milk but lately before it was killed, as they wish it to have, a pretty large piece of curd is found in the maw or stomach, which they wish to wash, but not to dissolve or destroy by washing. The maw being washed, by causing water to pass through it, they hang it up near a fire for some two or three hours, or till a little dried. Then take it, and put a quantity of salt into it all around the curd in the stomach: they then put it up, by rolling it together, with a sufficient quantity of salt between each fold, then place it near the fire, in a dry place, for use.

CCXVIII. To prepare thickening, bait, or rennet, from calf's maw or stomach, take one calf's maw, of about five or six weeks old. If older or younger, they will be stronger or weaker. Cut it all into small pieces, and then put it into an unglazed or stone vessel; pour upon it one Scotch pint of warm water; stir it at times, allowing it to stand for the space of two days: then pour off the clear li-

quor: to every choppin, add half a gill of good whisky or rum; put it into bottles, and cork them sufficiently hard. The quantity of rennet must be according to the quantity of milk, and the goodness of the preparation; but one table-spoonful and a half will be found sufficient to thicken a large tubful. The requisite quantity must be determined from experience. Some have thickened milk by putting a fish, a frog, and the like, among it.

OF BUTTER, AND BUTTER-MILK.

CCXIX. **T**HE manufacturing of cow's milk into butter, and butter-milk, in either summer or winter, or in both, has been universal throughout all Britain, therefore must be generally known, though, we are disposed to think, without perceiving the advantages or disadvantages which do attend it on particular farms,

in particular circumstances, in certain situations, &c. Neither do we pretend to point out all these, or the half of them; as we do not enter upon particulars, only in general.

CCXX. Milk, which is intended to be made into butter, and butter-milk, on being drawn from the animals, should be put into milk-tubs, and filled to a proper depth, viz. from two inches and a half, to three and a half, and placed in a cool milk-house, during the space of twenty-four hours, when it should be taken up, and passed through a fine hair-scarce or sieve into the churn, which must be lightly covered, where it must be allowed to remain quiet until it hath acquired a proper degree of sourness; because, unless milk is allowed to sour, butter cannot be brought to separate, which will generally be found to have taken place by twenty-four or thirty-six hours, shorter or longer, as the place in which the milk is placed happens to be of a higher or lower

degree of warmth, and the churn properly seasoned by use; then the operation of churning may be performed.

CCXXI. The method in most frequent use in the greater number of places in this part of the country, is by means of what we may term the common churn, with its staff and head,—the mode of working this kind is by repeated and rapid depressing and elevating the churn-staff and head among the churnful, or nearly full of milk, with the hands; yet in a regular, steady, cautious manner, until the wished-for effect is produced.

CCXXII. We find it difficult to describe, give, or convey a clear idea of the action or exercise of churning in words; but since the manner of performing the operation is pretty generally well known, this is of less importance.

CCXXIII. The churning should be steadily continued, until the butyrace-

ous part, is sufficiently well separated from the other parts of the milk; and this is known to have happened when it is formed into pretty large and distinct partictes; which, upon allowing the milk to rest, does collect, accumulate and cohere pretty firm, tenaciously, and close together upon the surface of the other parts of the milk, now termed butter, sour, or churned milk; when thus properly wrought, until sufficiently separated, it will naturally swim upon the surface of the butter-milk, and then it ought to be taken out of the churn from the butter-milk, by means of the whey-cup, or the like, and put into a vessel of pure soft cold water; in which it will be necessary to work the butter thoroughly among it with the whey cup, or a cool clean hand, as lime-mortar is wrought. In order that the butter may be washed entirely free of milky particles, it will be found requisite to give it three, four, or more times, fresh water, after having poured off the former. In each water, it will be needful to scatter and

gather together the butter, repeatedly, among the water; and thus the renewing the water, and washing in it, must be continued, until it has entirely ceased to communicate any colour to the water.

CCXXIV. Immediately after the washing in the water, it will be found, if attended to, that some considerable quantity of the water still remains interspersed among the butter, which must be carefully expelled, by working the butter with the whey-cup, or a cool hand, upon the bottom of the vessel in which it was washed, or upon a smooth wet board, until the interspersed water is as entirely eradicated as possible. The working upon the board should be continued until water ceases to flow from it.

CCXXV. Notwithstanding of all care taken as to cleanliness, some hairs and motes, or particles of matter, may get into butter, in the course of working, which should be studiously looked

for, and taken out, as they appear, in the time of washing and working out the water, &c. After working out the water, or as it is a-working out, it will be adviseable to draw a table-knife, repeatedly through the butter, in divers directions, so as to separate it all into small pieces; by this simple mean, some hairs will be brought out upon the edge of the instrument, if any great number are in it. This simple operation should be diligently performed several times upon every piece of butter.

CCXXVI. The butter being sufficiently well cleared of the butter-milk, by washing in water, and the water interspersed among it discharged by working upon a board, &c. it may be said to be prepared for salting. When butter is to be immediately put to table use, it may either be salted or not, as inclination may dictate: But if it is to be put aside, but for a week or two, it must be fully salted. In this case, then weigh the butter accurately, and to each stone put in one

pound weight of good dry salt, or one sixteenth part of the weight of the butter, and then mix the salt thoroughly among it, with all imaginable care, thoroughly mixing the salt in the butter, by working it with the whey-cup, or a cool hand, until sufficiently mingled: this is, of all others, the most material piece of all the business, tho' by no means the most difficult to perform; the above is the proper quantity of salt for preserving butter; yet more or a less quantity could not be depended upon without much hazard; and, if ever ventured, must be at the risque of both the owner and consumer; it would be less dangerous to give a little more than the contrary.

CCXXVII. It now only remains to be observed, at present, respecting this article, that it will be found absolutely necessary to well preserving butter after being properly cured by sufficiently seasoning with salt; it must instantly be put into, and carefully packed close together, in a firm, neat, clean

vessel, after having carefully sprinkled the bottom of it all over with a little dry salt, and then covered with a clean cloth, to prevent dust falling into it. The vessel, previous to the putting the butter into it, should be well prepared for this purpose, by repeated scalding with hot water, free airing, and repeated hard rubbing with a coarse cloth in warm water, and after that moderate drying. If the vessel into which the butter is put, is not well seasoned, it will be found impossible to prevent it from acquiring a smell and taste, all around, near the surface within the vessel, if not through the whole, particularly disagreeable.

CCXXVIII. On purpose to give butter a sweet taste, some advise to put into each stone, along with the salt, four ounces of white sugar, previously reduced to fine powder. This is, we should think, at least innocent, beside rendering the butter more pleasant to some palates; it will be found to have the effect of preventing it from becom-

ing so very firm in winter frost, as otherwise it would do.

CCXXIX. Butter, as well as cheese, may be tinged of almost any degree of yellow colour, by putting in among the milk, before, or in the time of churning, decoctions of carrots, infusions of logwood, &c. Though these colouring substances may be harmless in their nature; yet, as these colouring articles are frequently employed with a design to deceive the purchasers only, the practice should be discouraged, except for one's own family use.

CCXXX. It may be observed, that if butter is not sufficiently well cleared of the butter-milk, and also of water, when it is salted, it will be very apt to misgive in curing, by means of the fluid remaining in it, whether milk or water, dissolving and carrying away with it, out of the butter, too large a quantity of the salt. Butter has sometimes been found so imperfectly cleared of milk, that considerable quantities

of curd-like stuff have been observed in and among it, with brine of a milky colour, as if it had not at all been washed; in other instances, it has been surrounded with too large a quantity of colourless fluid; which last is a certain evidence, that the butter had not been properly cleared of water, after washing, &c. &c.

CCXXXI. If attended to, milk will be found to undergo, during the course of churning, several observable variations with respect to appearance; and in some instances also in consistence; and in many instances likewise with respect to quantity or visible bulk. On the commencement of the churning, the milk if observed upon the churn-staff appears exceedingly smooth and uniform to the eye; but after the operation has been continued some considerable length of time, sooner or longer, as the milk is less or more difficult to churn, the smooth uniform appearance gradually evanishes away, the milk becomes less smooth, although it

cannot be said to have become of a heterogeneous appearance. As the process is farther continued, the milk becomes a little rough like to look at, evidently consisting of many little points or particles adhering close together; and, as the operation is still farther carried forwards, this appearance becomes more and more distinct; and the particles scarcely before observable to the eye, appear sensibly distinct and larger, with the intermediate spaces between them, filled up with a milk-like fluid: but which also appears upon narrowly inspecting it, to consist of innumerable small particles. After the milk has been brought to this state, by a little more working, the larger particles very soon become much larger, and still more distinct, and cohere together, when allowed to rest floating upon the surface. The churning should be steadily continued until the butter has been formed into large particles, and, upon allowing it to rest, does collect and adhere pretty firmly, and close together upon the surface of the butter-milk.

CCXXXII. Though, in many instances, churning may be performed while the milk remains nearly of the same bulk as before the operation was commenced; nevertheless, in not a few instances, during the course of the working, it swells very considerably, very probably from the intanglement of some portion of the external air in the milk by the working, or from the separation of air from the milk itself, occasioned from some chemical process taking place during the course of the operation. Some observe, that milk is more liable to swell, when the season is cool, or when the milk has stood in a very cool place, until the operation is begun; and when some quantity of fresh milk has been put in among the former, immediately before the commencement of the churning. When milk swells considerably, it will be necessary to take out part of it into a clean vessel, at any time, when the churn becomes too full to admit of freely working, without losing part of the milk. If the swell continues till the

operation is pretty far advanced, so that the milk first taken out is not got in again, it will then be requisite to take out so much more of the milk, as to allow of that which was first taken out being put in again; and that taken last out must also be put in again, after the swell has subsided so far as to admit of it, before the milk is quite well churned; because, if any part of the milk has got but very little churning, when taken out, and has been kept out until near the finishing of the operation, and then put in, it will be found to lengthen out the operation unnecessarily.

CCXXXIII. As a method much preferable to washing in water, as we have been recommending, some advise to separate the butter-milk from the butter, by working it upon a clean smooth board, or in a clean bowl, until all the milk shall be entirely discharged from it; and it is advanced, in favour of this mode of treating it, that the butter, cleared of the milk in this manner, is,

much more pleasant and sweet in taste, when used fresh, than it would have been if washed in water. As for the truth of which we can neither affirm nor deny: but if pure soft water only is employed for this purpose, as ought certainly always to be the case, and if duly cleared of it afterwards, we cannot perceive how it could affect the taste in the least, unless some volatile matter from the hand should have the effect: but the same objection comes against working out the milk with the hand. One part of a piece of butter might be wrought with the hand, and another part of it by means of some instrument, as a skimming-cup, or the like; and then make trial if their taste was perceptibly different. Butter which is to be put up for after-use, we apprehend, should not be ventured without washing, without some experience of the practice, except for trial only.

CCXXXIV. Butter is, perhaps, capable of being badly affected from the hand by which it is wrought. There

can be no doubt, but that a large quantity of volatile matter is constantly flying off from the human body, from the fore-side of the hands, as well as other parts, especially when unordinary warm; but whether this may be at any time in such considerable quantity, and of such quality in any individual, as to taint butter, so as to be sensibly perceived by the taste, we could not venture to determine: yet it is on this account, that we have rather recommended or spoken of taking out and working butter with the skimming-cup, or a cool clean hand.

CCXXXV. Respecting the churning of milk, it may be noticed, that upon different farms milk will be found to require very different degrees of time and labour, perhaps the double, to bring the butter and milk to separate, than upon some others.—The butter of some particular farms, too, will be found much more apt to be injured from brisk and incautious churning: in general, it will be of conse-

quence, towards the end of the operation, to work the milk rather more slowly and cautiously than near the beginning; though, through the whole course, as was before observed, the churning should be pretty regular, steady, and constant, though slowly performed. Quick rushes in churning ought to be guarded against in every period of the work.

CCXXXVI. Upon farms, the milk of which is known to be difficult to churn, with respect to the length of time required to perform it.—It has been found, by experience, to be of some benefit, as tending to promote the operation, to allow the churn, and milk in it, to stand near a fire, or in a warm place, for the space of one night or more, just immediately previous to churning.

CCXXXVII. Also where their milk is liable to be very considerably injured in colour and consistence, or both, from slight and trifling causes, as a slight

variation, in churning a little less or more briskly, a little less or more warm when churned, &c. it will generally be found of some advantage, in warm seasons, to place the churn in cold water in the time of the operation of churning, and for some few hours before it be begun.

CCXXXVIII. Some farmers are in the daily use of putting into each churn of milk, several Scots pints of water, a little warmed: in the summer season they give it but very little heat, (we suppose it may be about 60 or 70 degrees;) in the harvest and spring season, they give it a little more heat; and, in winter, they allow it to have become hot; which, they say, tends powerfully to facilitate the churning, without observably affecting either the colour or consistence of the butter.

CCXXXIX. Still it remains to be observed, when butter has been sufficiently well salted, and packed together in a firm vessel, ordinarily some

part of the salt is dissolved with the moisture from the air, and in the butter, forming a pelucid salt liquor, termed butter brine, surrounding the butter at the bottom, and sometimes up to the very top. In cases where this does not take place at all, or when it surrounds it but a little way up the vessel, or when the original brine is lost, by removing the vessel from one place to another, or otherwise: in such instances, it will be necessary to make a strong solution of salt; which is done, by dissolving so much salt in a given quantity of soft fresh water, as the water is capable of dissolving; so much of which must be poured upon the butter, as shall be found sufficient to fill up all the vacancy between the vessel and it, up to the top.

CCXL. This is a thing the more particularly necessary to be attended to, because butter will scarcely be found well preserved, even to a few months old, without brine around it: a little salt should also be occasionally sprink-

led upon the top of it, after the former has melted entirely.

OF CHEESE AND BUTTER OF THE
SAME PARCEL OF MILK.

CCXLI. **W**HEN milk is to be disposed of in the above manner, whenever milked, it should be poured into so many milk-tubs, placed in the milk-house, or soon to be put into it, as shall be found sufficient to contain it, without allowing the milk to exceed two inches and a half, or three and a half at the utmost in them, where it must be allowed to remain quiet during the space of thirty-six hours, or between that and twenty-four hours at the least, before it can be lifted, in order to be manufactured in the above manner to the best advantage.

CCXLII. That which we more particularly intend, is to try to point out

some of the causes, which more usually occur, proving special hinderances to the speedy separation of the parts of milk, and the means which should be employed for avoiding these, and are likely to have the most certain and considerable influence in inducing the speedy separation of the cream from the other parts of the milk, and that more completely and expeditiously.

CCXLIII. As gain is ordinarily one great object to be had in view, and is both a rational and reasonable inducement for people to dispose of milk in any one particular manner rather than another: therefore every circumstance of any real importance, respecting the profitable manner of management in general, as well as that which may relate to particulars, deserves also to be carefully inquired into; and, indeed, ought to be well understood by all who practise this business. It will readily be understood, that any inquiry respecting the proportion of butyraceous or cheesy

matter, contained in milk, is at present entirely out of the question.

CCXLIV. Owing to the butyraceous particles contained in milk in its entire state, being specifically lighter than the cheesy particles, they naturally ascend to the surface of the other parts of this liquor: if it is allowed to remain any considerable space of time quiet immediately after being milked, and placed in an apartment, the temperature of which, with regard to heat, is not much above 50 degrees, the butyraceous part will natively and gradually approach to, and, after a while, be collected upon the surface, naturally forming the substance, well known by the name of cream. The ordinary, and almost only manner of separating the cream, when thus formed from the cheesy parts, is by skimming.

CCXLV. The separation of the butyraceous part, even by this natural process, owing to the length of time necessarily requisite, from the smallness of the

particles, and the resistance given, which they have to overcome, from the natural tenacity of the fluid, for accomplishing a pretty complete accumulation of these particles together into the form of cream, and the causes which may, and frequently do take place, and have the effect of protracting the separation, are no inconsiderable obstacles to the business before us.

CCXLVI. From several well known facts and observations, we are inclined to impute the imperfect and tedious separation of the cream to the few following causes, viz.

1st, Imperfect cooling.

2d, Slow cooling.

3d, Milk naturally unusually thick.

CAUSES OF THE FIRST KIND.

CCXLVII. **O**F the better known and more obvious

causes, whereby this vegetable, or rather animal fluid, is more frequently prevented from becoming sufficiently cool, which, we imagine, it may be said to have attained only, when it has arrived so low as 50 degrees, or a little lower. We can only enumerate a warm state of the general atmosphere, by which the heat of every house must, in some measure, be affected. And, 2dly, An improper milk-house. A warm state of the atmosphere should; and, indeed, can alone be guarded against by means of a proper milk-house, for which see No. 131, &c. and should always be timeously and sufficiently provided against.

CCXLVIII. It is a fact well worth attention, that neither any fluid nor solid substance whatever will become cooler, nor continue any considerable length of time warmer than the temperature of the place is of, in which they are placed in: therefore, as the temperature of the milk-house is, so will the temperature of the milk in it

come to be, as was formerly observed; but what space of time it will require to become of the very same temperature with the atmosphere of the house, we could not determine.

CAUSES OF THE SECOND KIND.

CCXLIX. **I**N order to hasten the cooling of this nourishing mother-fluid, several means should be employed. As we may reasonably suppose, milk, like every other substance, whether solid or fluid, will cool sooner, when there is only a small quantity of it together in the vessel: therefore it must be of particular utility to have the milk ebb, or thin, or what we term so, in a position to deepness; indeed the milk, when wished to cool soon, should never be of a greater depth in the tubs than is absolutely necessary to their being got skimmed, too, when it is ebb, the cream will

have a shorter course in coming at the surface.

CCL. Also, on purpose to cause this useful liquor cool sooner in a warm season, and when the milk-house is not so cool as it could be wished, or when the slowness of its cooling is suspected of retarding the separation of the cream; it will be found, upon trial, to be useful and innocent, to add one third part of cold, clean spring water, or other water, if quite fresh; it should be put into the milk, when poured into the vessels in the milk-house; meanwhile, the proper depth, above-mentioned, ought not to be exceeded, including both milk and water, or, which is the same proportion to two gallons of milk, put in one of water.

CAUSES OF THE THIRD KIND.

CCLI. **I**NDEPENDENT of any regard had to the quick cooling, in instances where milk is suspec-

ted of being very thick, a circumstance which we are not certain if ever, or at least, if it does often take place; the adding of water to it in the above proportion, or thereabout, will, by rendering the milk more dilute, tend very much to facilitate the separation of the butyraceous particles, by lessening the cohesion of the milk, consequently the resistance given to them, in arriving at the surface of the other parts of the liquor, must be considerably diminished.

CCLII. Upon some farms, the milk does not cast up the butyraceous part so completely as might be expected, which is evidenced by the richness of their cheese, and the small quantity of butter their milk affords.

CCLIII. It may, we apprehend, be very proper to try, mixing some water with all the milk upon such farms, and, if found beneficial, for promoting the separation of a larger quantity of butter, it will be worth attention and practising.

CCLIV. Farther, in order to facilitate the cooling of this white fluid, and also, at the same time, render it more dilute, water may be added to it at any time, when newly milked. We are fully persuaded, though this practice may be carried too far, by either employing it when unnecessary, or by making use of water when in an unfavourable state, for the end in view; nevertheless, a due proportion of water may be profitably mixed into such milkings, as it shall be known must necessarily be taken up, before the cream will have sufficient time for collecting.

CCLV. Hence water may be put into the last milking before whey-making, and also at the same time, for the purpose of forwarding the above separation, in very hot or fiery states of the atmosphere, when milk, if not uncommonly soon lifted, will be apt to sour. Moreover, if milk is properly watered, it may be taken up without almost any disadvantage, after having stood twelve hours. We have seen a

pretty intelligent farmer in this neighbourhood, who has practised the watering of milk repeatedly, and he considers it as no inconsiderable improvement.

CCLVI. In very hot weather, some have a custom of sprinkling upon the bottom of every vessel into which milk is to be put, as much common salt as would season an egg—saltpetre would, perhaps, have the same effect, if so applied in a less quantity.—It will only be necessary to practise this upon such as must stand long.

CCLVII. As the milking times recur oftener than the making of whey does*, some meals of milk behove to have stood longer than some others; for it is but few farmers who have a sufficient quantity of milk at one milking, which is termed one meal of milk to make whey of alone: neither do

* We use the term of whey-making for the whole operation of changing milk into cheese in the manner we are speaking of.

all farmers allow their milk to stand alike long, nor alike long at all times.

CCLVIII. After milk has stood a longer or a shorter length of time, as above said, and the churn hath been also properly seasoned for receiving the cream, the business may be proceeded to.

CCLIX. The manner of proceeding is, first, with a view to get the skimming more completely and conveniently accomplished; pass one finger of a hand round the inner-side of the vessel of milk, just where the cream is adhering to—pressing moderately upon it, so that the cream may be loosened, and as perfectly separated from the side of the tub as it can conveniently be done: being thus loosened, then take off all the cream from it with the skimming-cup: in doing this, use all possible accuracy and wariness, least part of the cream be left behind, or a larger quantity of the thin milk than is necessary should be taken up, along with the

cream, or the two be jumbled together. On being taken off, it must be passed through a searce or sieve, into the churn, where it ought to be allowed to remain quiet, and lightly covered, until sufficiently filled with cream, and duly soured.

CCLX. And the milk, as it is skimmed, must be poured into a pot placed upon the fire, on design to be heated, when it must be strained and managed, as in No. 174, to No. 207.

In a manner as near to the above, as we could describe in words, each vessel should be skimmed, and the cream put into the churn, and the skimmed milk lifted, and put into the pot upon the fire, &c.

CCLXI. The heating of the milk, and other parts of the process are the same in making cheese from skimmed milk, as have been described; therefore we have only to observe, that, owing to the milk being robbed of the buty-

raceous part, by the skimming, the cheese which skimmed milk produces, therefore usually denominated skim-milk, or common cheese. This kind of cheese, owing to its being almost clear of butter, will be found much less critical to manage.

CCLXII. The curds, in place of being pressed with the hand or whey-cup only, may be, in this case, freely overturned or cut with the cup, when found necessary; and, in place of cutting the curds with a knife or curd-cutter, the curd made from this milk may be reduced to girth of any requisite degree of smallness, by repeatedly grasping and squeezing it to pieces with the hands. We must allow, that when any thing considerable of buty-raceous particles are contained even in milk to be made into this kind of cheese, the other method should be preferred, which must be judged of by the operators; but, in general, there are so few of these in cheese of this kind, that they are scarcely worth the regard.

ing. Also, people are better acquainted with, and so abler to execute this part of the business in a more dexterous manner, and so effect a more thorough separation of the whey, and the reduction of the curd, to the proper degree of smallness, in this their usual way, than the other, otherwise we should still prefer the other fashion of doing, even in this case.

CCLXIII. It will press in a shorter space of time, and require even fewer turnings in the cheese-fat in a given time, consequently fewer cheese-cloths and fats will be needful; neither will it be so apt to be injured with rough handling, nor so difficult to winnow.

CCLXIV. The making of whey may be fallen about at any time of the day; most usually it is done in the morning; and we think it will generally be found most convenient to do it at this time of the day. Some are in use to make it every lawful day, and twice upon Saturday, to wit, in

the morning, and in the afternoon towards evening: others make it only every other day, except upon Saturday they make it twice, as before mentioned, on purpose to avoid doing it upon Sabbath.

CCLXV. We are fully convinced, however, that, in order to allow the milk a due length of time for casting up the cream, with the intent to be got sufficiently skimmed before being lifted, and manufactured into cheese, before it has stood so long, as to have acquired any disagreeable taint, capable of affecting the taste, colour, or consistence of the cheese; it will be found highly requisite, if not absolutely necessary, to make whey every day, and twice upon Saturdays.

CCLXVI. Thus, upon Monday morning, take up the Saturday's milk, and allow the Sabbath's to remain.

And, upon Tuesday, take up the Sabbath's milk, and allow Monday's to rest.

And, upon Wednesday, take up the Monday's, and allow the Tuesday's to stand over.

And, upon Thursday, take up Tuesday's, and allow Wednesday's to remain.

And, upon Friday, take up Wednesday's, and allow the Thursday's to rest.

And, upon Saturday morning, take up Thursday's, and allow the Friday's to stand.

And, upon Saturday's afternoon, towards the evening, take up the Friday's, and allow the Saturday's milk to remain for Monday next week, &c.

CCLXVII. Those who make whey every other day only, usually take up, upon Monday, Saturday's milk, and one milking of Sabbath's forenoon.

And, upon Wednesday, they take up one milking of Sabbath, and Monday's milk.

And, upon Friday, they take Tuesday's milk, and one milking of Wednesday.

And, upon Saturday's forenoon, they

take up the remaining milking of Wednesday, and Thursday's milk.

And, upon Saturday's afternoon, towards evening, they take up the Friday's milk, &c.

CCLXIX. But, after all, we must allow, the passing of a certain number of hours is not always to be so strenuously adhered to, as if nothing could be improperly conducted while that was implicitly attended to, under every circumstance which may take place.

CCLXX. Therefore it may be observed, tho' the manner we have above recommended, in No. 266, will, we imagine, be found liable to the fewest objections; yet, in the beginning, and latter part of the summer season, and in high cool situations, while proper attention is paid to seasoning the milk vessels, and the opportunity of a good milk-house is enjoyed; with the aid of these, some latitude may be taken without much damage under these circumstances.

CCLXXI. The course of one summer's experience in the business will be sufficient to teach any one unacquainted with it, how much depends upon the state of the atmosphere, and many other things, which, without experience, one could not easily be convinced of.

CCLXXII. In hot rainy times, particularly when thunder clouds are passing over or around, milk will be found apt to sour unordinarily soon; therefore it will be requisite to lift it rather sooner than usual at other times.

CCLXXIII. Cheese of skimmed milk may be tinged of a rich colour by decoctions or infusions of wood, seeds, flowers, &c. but, as these only tend to improve the appearance, and not the quality of the cheese, should not be suffered by the Magistrate, and if done to enhance the price, without improving the article, except in appearance, is wickedness.

OF HOVEN OR SWOLLEN CHEESE.

CCLXXIV. **T**HE hoving of cheese is certainly well known to people in general, and is a thing, we imagine, which cannot be often occasioned from any other cause in cheese, than insufficient seasoning with salt when made: the salt must either have been allowed in an insufficient quantity, to the quantity of the gurth, or it has not been sufficiently mixed thro' it before pressing, or there may have been, at the time of salting, too much whey then remaining in the gurth; which, in the course of the pressing, must have carried too much of the salt away with it.

CCLXXV. The making use of putrid rennet or bait may have some influence, though we scarcely consider this ever will have sufficient effect alone. The laying cheese into a too

warm place has frequently been reputed one of the chief, or the only cause, of hoving in cheese, but without any just foundation: for though external heat will most certainly hasten on, and promote the process; yet, as the swelling is occasioned, as we suppose, from some particles of the cheese running into a state of putrefaction, emitting air forming the cavities so very observable in hoven or fire-fanged cheese, as it is vulgarly termed. We cannot admit heat to have any other effect, than of forwarding the process: though it is even reasonable to suppose, that cheese may become somewhat hoven from the application of a considerable degree of heat, which otherwise would not have been the case; or, at least, it would not have become any thing considerable.

CCLXXVI. To prevent, as well as to stop, hoving in cheese, lay them into a moderately cool, dry place, and turn them regularly. When ever a cheese becomes considerably swollen, it will be requisite to prick it in both sides in

several places, particularly where most elevated, by thrusting an awl, a large pin, or the like, pretty deep into it; and this should be repeated as often as may be found necessary; though the pricking will not altogether prevent the swelling, yet it will, by letting out the confined air, render it less considerable, and the cavities in the cheese will not be so disagreeable, and consequently less unsightly to the eye.

CCLXXVII. Full milk cheese, tho' not sufficiently salted, owing to its less tenacious consistence, seldom or never swells to any notable degree; but it acquires a more disagreeable smell and taste, than hoven skimmed milk cheese usually does, and often produces large quantities of maggots, which seldom or never happens when well made and preserved.

OF PREPARING BUTTER FROM
CREAM OF MILK.

CCLXXVIII. **A**FTER the cream has been taken off the milk, as formerly directed, it should be passed through a hair searce or five into the churn, which should be placed in a dry, airy situation, lightly covered with a thin, clean cloth; but if dust is apt to be dropped from the roof, or the apartment otherwise dusty, whereby dust may be apt to be dropped into the milk through the cloth; it ought, in that case, to be more sufficiently covered, where it should be allowed to remain quiet until filled up with cream, fit for working.

CCLXXIX. The length of time that cream may be allowed to stand in the churn before it be churned, without any injury, must depend upon several circumstances. We are disposed

to imagine, the period of time, in the ordinary heat of our summers, should not exceed six or seven days; and under some particular unfavourable circumstances, it will be found to have sustained considerable injury, even before the expiration of this short period of time.

CCLXXX. Some farmers, who have a large quantity of milk, are in the custom of filling two or three churns at the same time, and then churn them all at one time, to the intent that they may have this business but seldom on hand.

CCLXXXI. The circumstances which we have been able to perceive, proving particularly detrimental to both milk and cream, when standing in the churn, are a close, damp house, without free air, and a churn badly seasoned, and mouldiness upon the inner-side of the churn, also affecting the surface of the milk at the same time.

CCLXXXII. We know, for certain, that, in some instances, butter of a very bad quality has been produced from milk which had been kept in the state of cream, in a close, damp, badly aired apartment, where the inner-side of the churn and surface of the milk had become mouldy before churning. To the above causes we must still add, long standing before churning, which alone will produce all these bad effects, without the aid of any other cause whatever.

CCLXXXIII. Cream, very considerably injured in the above manner, produces butter of a soft consistence, and of a dull white, verging to green. By age, the colour improves to a more lively green; both the taste and smell are highly disagreeable.

CCLXXXIV. Whether the naughtiness of the butter, in such cases, proceeds from, and should be allenarly imputed to the mouldiness which had taken place, as the effect of the close,

damp, badly aired apartment; or if dry free air is absolutely necessary to the properly souring of cream, we imagine, that we have not yet sufficient evidence for putting this point beyond dispute; nor if a certain degree of rotting does take place, and is the cause of the mouldiness, in such instances, whereby, when mixed, the whole is tainted.

CCLXXXV. The impropriety of filling a greater number of churns at the same time, than can be got filled within a due length of time, will be sufficiently evident from the baneful effects of allowing milk to stand too long in the churn.

CCLXXXVI. In order better to preserve the milk, the churn should be repeatedly scalded with hot water, and well washed, by hard rubbing with a coarse cloth in cold water, and fully dried, immediately before putting milk into it; and when the milk is in it, it should be kept into a dry, airy place.

If these things are properly attended to, butter will seldom be sensibly affected, though it should stand eight days in cream; yet the shorter time it stands, the less danger. We would advise, that it never should be allowed to stand above one week in any case whatever.

CCLXXXVII. If, notwithstanding of all precautions taken, the inner-side of the churn and cream should become mouldy, it may be of some small benefit to well rub the mouldiness off the inner-side of the churn, with a dry, clean cloth, and then carefully take off all the mouldiness from the milk, by carefully skimming the cream; that is, take off all the mouldiness along with a little of the surface of the cream.

CCLXXXVIII. With regard to the operation of churning, and the manner of conducting the after pieces of the business, see from No. 220, to No. 240.

CCLXXXIX. Though, as has been

observed in No. 77, to No. 93, there is not a little diversity in the richness of the milk of individual animals: yet, as this happens in some individuals in a stock only; it is a circumstance, however well deserving attention in itself, of less magnitude, in inducing people to make all their milk, into either full milk cheese, or into butter and skimmed milk cheese, or, into butter, and butter-milk only; than, the variations in the richness of milk, arising from the nature of the pasture that they are fed upon: by this, the milk of the whole stock of milk-cattle comes to be affected, in some measure, more or less.

CCXC. Milk, which contains a large proportion of butyraceous matter, will be most profitably made into butter, and butter-milk, or into butter, and skimmed milk cheese. Milk, again, that contains much cheese, will be more frugally made into full milk cheese; the preference of the one method of disposing of milk before another, must be determined from

the qualities of the milk each particular farm produces, together with the price the several articles bring in the market, and also with the ready market the local situation of the farm shall afford, for the sale of butter-milk or whey. It may, once for all, be remarked, that a farmer never will be a profiter, by making all his milk into butter, and butter-milk, unless he can find a market for his milk: but if so, the more butter his farm produces, the more will he be a profiter; and, though in the neighbourhood of the market, if his milk produces but little butter, he will be a greater gainer by making full milk cheese, or butter and skimmed milk cheese; the utility of the one of these two before another, must be ascertained by experiment, as is soon to be mentioned and calculated from the succeeding table.

CCXCI. Though we, or any one the least intelligent in country affairs, can readily understand how it will come to be more profitable, in certain

circumstances, to dispose of milk in this, that, or the other manner; yet no one can, for certain, know when these particular circumstances actually do take place, without previously obtaining certainty, by experiments made upon the milk, what the quantity of both butter and cheese are contained in the milk of cattle, when separated, while kept upon the lands, the qualities of which milk is in question.

CCXCII. In order, precisely, to ascertain, by simple experiment, the quantity of butter, and of full milk cheese, the milk of a particular farm is capable of producing.

CCXCIII. Take two, three, or four days milk of all the milk cows on the farm, and, after having set it into the milk-house, until properly cooled, pour it into the churn, or into two of them, if one is not fit to contain it, where it must remain quiet, till it has acquired a due degree of sourness, which may be about twenty-four hours—when

should be churned, the butter carefully collected, washed, and accurately weighed, previous to salting it; the butter-milk should also be disposed of by sale.

CCXCIV. Then take the same number of days milk of all the cows, next succeeding, and, in the usual manner, make into full milk cheese; when about ten days old weigh it, the full milk cheese whey being also previously disposed of: add the price of the butter and butter-milk together, of the first experiment, and the price of the full milk cheese and whey, of the second, and then it will be exactly known, whether it will turn out more profitable to manufacture the milk of that farm into butter, and butter-milk, or into full milk cheese.

CCXCV. In order then, accurately, to ascertain, whether it will be most profitable to make full milk cheese, or butter and skimmed milk cheese, of the milk of any particular farm, at any

time in the month of June or July, when the milk is pretty lready in point of quantity.

CCXCVI. Take the cream of so many days milk, of all the milk-cows upon the farm, as shall be found sufficient to fill up one or two churns with, fit for churning; then churn the cream in the usual manner, until the operation is accomplished, when the butter should be carefully collected, and well washed in water, and weighed, before seasoning it with salt; and mark down the weight and price upon paper, with pen and ink.

CCXCVII. To render this part of the experiment more certain and decisive, the milk from which the cream is taken, ought to have stood over the usual period of time, previous to being skimmed; and the skimming should also be equally, accurately, performed, though not more so than as at other times.

CCXCVIII. As the cream is collecting for making this part of the experiment, the skimmed milk must be made into cheese immediately after it is skimmed, in the ordinary manner, by itself; and when it has gotten ten days drought, weigh it, and put the weight and price upon paper, immediately under the butter, and add the two sums together into one.

CCXCIX. Immediately after, take the same number of days milk of all the milk-cows upon the farm, and make it into full milk cheese in the proper manner; after being allowed ten days drought, weigh it, and mark the weight and price of it also upon paper.

CCC. If the farm lies in a situation, where the whey and butter-milk can be got regularly sold, the whole of the butter-milk and whey must be disposed of by sale; or which, as to the experiment, is the same thing, measure and value each of them, at what they would bring in the market: and when

they are sold, or measured, and valued, put down the measure and value of each to the article from which it was more immediately separated; but if the farm is quite remote from a butter-milk and whey market, these liquors are not to be taken into account, either more or less, in these experiments.

CCCI. Provided the butter and skimmed milk cheese are very accurately weighed, and properly valued as they should be, in the one instance, and the full milk cheese in the other case, and the butter-milk and wheys, as we have above directed, if taken into account, justly measured, valued, and placed under their respective articles, from which they were separated: we say, if all these things are properly conducted, it will then be perfectly understood, and clearly seen, which method will be the more profitable of these two; consequently the line of business, that ought to be preserved, pointed out.

CCCII. As the scale of the experiment, above set forth, is but small, some may be led from thence to imagine, that all the benefit that could be derived from any particular mode of manufacturing milk above another, will be but quite trifling: therefore we have subjoined a table, or made the following calculation, comprehending a pretty extensive variety, in respect of the diversity in the richness of milk; and upon a rather more liberal scale; by which the above experiments may be calculated to any extent.

CCCIII. It may be remarked, that we supposed the quantity of full milk cheese will be nearly the same upon each of the thirteen farms; though it will not be found equally rich in quality, as the milk which contains most butter, makes the richest full milk cheese. Hence the vast diversity of full milk cheese in this respect.

CCCIV. In the following table, we have for example: suppose thirteen

[Page 211.]

T A B L E.			[Page 211.]			l. s. d.			l. s. d.			l. s. d.		
No. 1st	Produces 40 Stone of full Milk Cheefe,	at 6s. 6d. per Stone,	13	0	0	13	0	0	0	0	0			
No. 2d	Produces 20 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	4	0	0	15	0	0	2	0	0			
	and 20 Stone of Butter, - - -	at 11s. per Stone,										11	0	0
No. 3d	Produces 21 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	4	4	0	14	13	0	1	13	0			
	and 19 Stone of Butter, - - -	at 11s. per Stone,										10	9	0
No. 4th	Produces 22 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	4	8	0	14	6	0	1	6	0			
	and 18 Stone of Butter, - - -	at 11s. per Stone,										9	18	0
No. 5th	Produces 23 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	4	12	0	13	19	0	0	19	0			
	and 17 Stone of Butter, - - -	at 11s. per Stone,										9	7	0
No. 6th	Produces 24 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	4	16	0	13	12	0	0	12	0			
	and 16 Stone of Butter, - - -	at 11s. per Stone,										8	16	0
No. 7th	Produces 25 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	5	0	0	13	5	0	0	5	0			
	and 15 Stone of Butter, - - -	at 11s. per Stone,										8	5	0
No. 8th	Produces 26 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	5	4	0	12	18	0	0	2	0			
	and 14 Stone of Butter, - - -	at 11s. per Stone,										7	14	0
No. 9th	Produces 27 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	5	8	0	12	11	0	0	9	0			
	and 13 Stone of Butter, - - -	at 11s. per Stone,										7	3	0
No. 10th	Produces 28 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	5	12	0	12	4	0	0	16	0			
	and 12 Stone of Butter, - - -	at 11s. per Stone,										6	12	0
No. 11th	Produces 29 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	5	16	0	11	17	0	1	3	0			
	and 11 Stone of Butter, - - -	at 11s. per Stone,										6	1	0
No. 12th	Produces 30 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	6	0	0	11	10	0	1	10	0			
	and 10 Stone of Butter, - - -	at 11s. per Stone,										5	10	0
No. 13th	Produces 31 Stone of skimmed Milk Cheefe,	at 4s. per Stone,	6	4	0	11	3	0	1	17	0			
	and 9 Stone of Butter, - - -	at 11s. per Stone,										4	19	0

farms, each maintaining six milk-cows, from whose milk, butter, skimmed milk cheese, and full milk cheese, are produced, in proportion to one another, as is represented in the table itself.

OF SHEEP MILK, AND SHEEP
MILK CHEESE.

CCCV. **T**HE milk of ewes, in its natural state, as drawn from the animal, is more ordinarily, in comparison with cow's milk, of a thicker consistence, and of a darker colour, containing a remarkable large portion of cheesy matter, in a given quantity; while the quantity of butyraceous matter, obtained from their milk, is usually uncommonly small, both in regard to the quantity of the milk, and with respect to the quantity of cheese which it affords.

CCCVI. It may, we presume, be

true, that the quantity of butyraceous matter, which this milk contains, may be very small, in regard to the proportion of cheese ordinarily obtained from it, (and we are fully persuaded, that it is so, from a trifling experiment which we lately made upon ewe milk cheese) though we do not pretend to be absolutely certain as to this point.

CCCVII. The true cause of this deficiency in the milk of sheep, though it may well deserve farther inquiry, yet may be owing to some other cause, than the mere absence of oily particles enough in it, although the most likely. Perhaps, by the ordinary method of treating this kind of milk, the oily particles are not sufficiently raised to the surface of the other parts of the milk, so as to be gotten separated, and which may be owing to the unusual resistance given to them by the cohesion of the other parts of the fluid, in rising to the surface. Or, it may be, the milk of these animals, and for some more beneficial purpose, naturally con-

tains only a small proportion of butyraceous particles in it, which appears to be the truth.

CCCVIII. Respecting the preparing of cheese from ewes milk, we could not give any particular instructions, not having obtained such a measure of knowledge of the subject, as would be requisite to enable us to give any useful information, or proper directions, beside what we have already formerly given, under the head of full milk cheese, and to which we must now refer, hoping the same, or nearly the same directions, will be found to apply to both.

CCCIX. With regard to preparing butter from sheep milk, that is the thing we scarcely have heard of being put in practice; and, perhaps, for reasons just assigned; but should it at any time, or upon any pretext, be judged requisite to make the trial, we suppose the same cautions and attention will be found useful, and equally applicable

in this case, as in preparing it from cows milk.

CCCX. It only remains to be remarked, that if butyraceous particles enough are thought to be contained in ewes milk, notwithstanding of what we have alledged, their separation from the other parts of the milk will most certainly be promoted by adding water to the milk, when newly milked, in the same, or perhaps in double the quantity, as formerly recommended.

CCCXI. If we mistake not, the oily particles of sheep milk are of a more tallowy nature than these of cows milk.

OF BUTTER-MILK CHEESE.

CCCXII. **I**N some places in Britain, as it is said, an inferior kind of cheese to every other, is made

from butter-milk in the same manner as skimmed milk cheese is prepared from skimmed milk. But as this is not, so far as we know, practised in this neighbourhood, nor is it of much esteem or value; therefore we judge it unnecessary to write more concerning this matter.

OF PICKING CHEESE.

CCCXIII. **A**S to chusing cheese of a good quality, we scarcely can give any proper information; only it may be observed, beside pleasing the taste, persons best seen in this, wish to pitch upon one pretty firm in consistence, and of a smooth surface; which, when pressed with the thumb or finger, rather gives way directly inwards, than sinks in all around the pressure; which last is a proof that the surface is very tough, and has been in-

jured in the preparing, by being overheated.

CCCXIV. Anent picking of full milk cheefe, we could not give the least farther assistance, unless the same rules were equally to apply, and which, we imagine, scarcely will happen in this case in every instance.

THE END.



